FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	BR 2B24(201)		1
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	COLORADO	
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90

SEE SHEET 2 FOR "INDEX OF SHEETS"

STATE OF TEXAS
TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FOR THE CONSTRUCTION OF REHABILITATION OF EXISTING BRIDGE

CONSISTING OF REHABILITATE BRIDGE

US 90

COLORADO COUNTY

CSJ: 0027-01-042

PROJECT NO.: BR 2B24(201)

LIMITS: AT THE COLORADO RIVER IN COLUMBUS (STR# 0027-01-001)

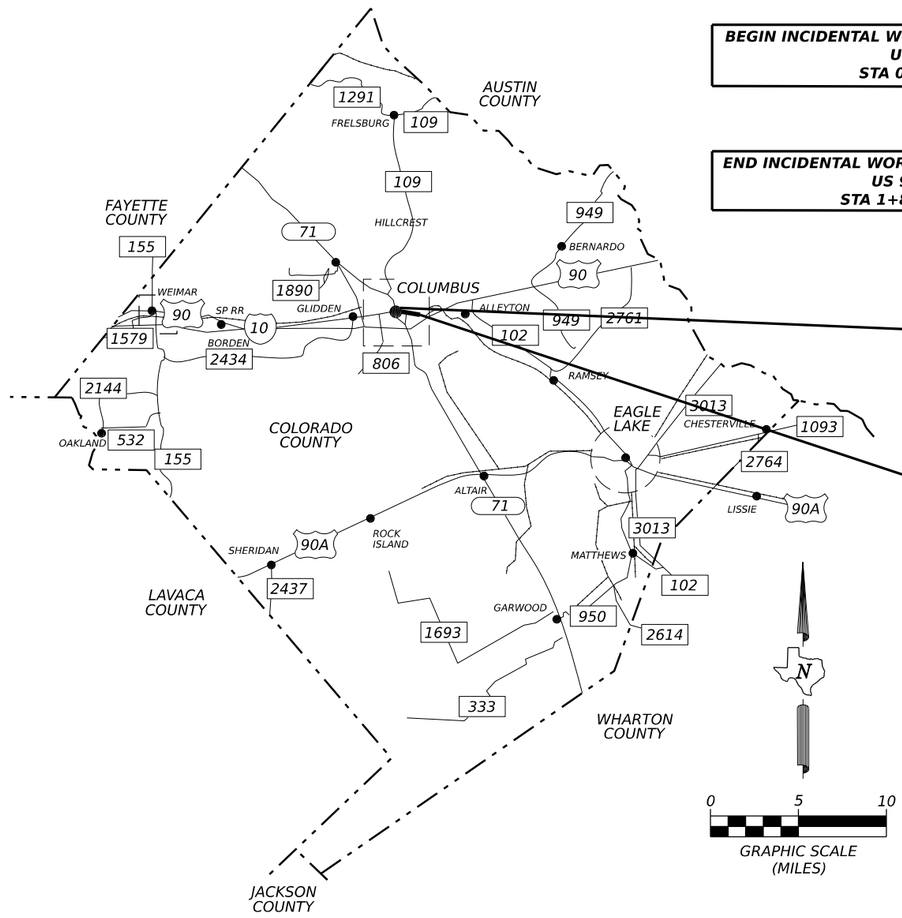
CONTRACTOR: _____
DATE OF LETTING: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE WORK ACCEPTED: _____
FINAL CONTRACT COST: $ _____

LIST OF APPROVED FIELD CHANGES:

HWY FUNCTIONAL CLASS: URBAN MAJOR COLLECTOR
DESIGN SPEED: N/A
ADT: 4,875 VPD (2022)
6,533 VPD (2042)

PROJECT LENGTH

ROADWAY	=	*1,759.00 FT*	=	*0.333 MI*
BRIDGES	=	*766.00 FT*	=	*0.145 MI*
TOTAL	=	*2,525.00 FT*	=	*0.478 MI*



BEGIN INCIDENTAL WORK
US 90
STA 0+00

END INCIDENTAL WORK
US 90
STA 1+80

US 90
BEGIN PROJECT
CSJ: 0027-01-042
STA 0+00
REF MRK = 758+0.436

US 90
END PROJECT
CSJ: 0027-01-042
STA 25+25
REF MRK = 758+0.850

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT AND LISTED FIELD CHANGES.

_____ *, P. E.* _____
AREA ENGINEER *DATE*

SUBMITTED FOR LETTING 03/26/2024

Amanda Anderle Fling, P.E.

DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING 3/28/2024

DocuSigned by:
Jeffery Vinklarek, P.E.
C5D9727173225F5...

DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING 3/28/2024

DocuSigned by:
Martin C. Horst, PE
894AD33213B4...

DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 2023).

COLORADO COUNTY
YOAKUM DISTRICT

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE AT GRADE.
(ONE PARALLEL WITHIN PROJECT LIMITS.)

TEXAS DEPARTMENT OF TRANSPORTATION

SHEET NO.	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3-4	TYPICAL SECTIONS
5-11	GENERAL NOTES
12-14	ESTIMATE & QUANTITY SHEET
15-16	MISCELLANEOUS SUMMARIES AND DETAILS
17	SUMMARY OF SMALL SIGNS
18	CRASH CUSHION SUMMARY SHEET
	TRAFFIC CONTROL
19	US 90 CTB LAYOUT
	STANDARD SHEETS
20-31	BC(1-12)-21
32	TCP(2-1)-18
33	TCP(2-2)-18
34	TCP(2-4)-18
35	TCP(3-1)-13
36	TCP(3-3)-14
37	TCP(3-4)-13
38	TCP(7-1)-13
39-46	TCP(SC-1-8)-22
47	WZ(RS)-22
48	WZ(STPM)-23
49	WZ(UL)-13
	ROADWAY
50-51	US 90 PLAN
	STANDARD SHEETS
52	ABSORB(M)-19
53	CCCG-22
54	GF(31)-19
55	GF(31)MS-19
56-57	GF(31)TR TL3-20
58	QGUARD(M10)(N)-20
59	QG(M)(W)-21
60	SGT(12S)31-18
61	SGT(15)31-20
62	SLED-19
63	SMTC(N)-16
64	SMTC(W)-16
65-66	SSCB(2)-10

SHEET NO.	DESCRIPTION
	BRIDGE
67-69	BRIDGE LAYOUT
70	TYPICAL SECTION (EXISTING)
71	TYPICAL SECTION (PROPOSED)
72	ESTIMATED QUANTITIES
73	CONSTRUCTION NOTES
74	SUBSTRUCTURE REPAIRS
75-77	APPROACH SPAN REPAIRS
78-81	RAIL END TREATMENT DETAILS
82	REPAIR SUMMARY AND DESCRIPTIONS
83	SPAN NO. 2 TRUSS REPAIRS
84	SPAN NO. 3 TRUSS REPAIRS
85	SPAN NO. 4 TRUSS REPAIRS
86	REPAIR NO. 1 TRUSS VERTICAL
87	REPAIR NO. 2 TRUSS DIAGONAL
88-89	REPAIR NO. 3 TRUSS SWAY BRACE
90-92	REPAIR NO. 4 TRUSS BOTTOM CHORD
93	REPAIR NO. 5 TRUSS TOP CHORD
94	REPAIR NO. 6 TRUSS END POST
95	REPAIR NO. 7 TRUSS PORTAL BRACE
96-99	REPAIR NO. 8 TRUSS FLOORBEAM
100	REPAIR NO. 9 TRUSS STRINGERS
101-106	REPAIR NO. 10 TRUSS GUSSET PLATE
107-110	REPAIR NO. 11 TRUSS HEAT STRAIGHTENING
111	REPAIR NO. 12 REPLACE RIVERT/BOLT
112-115	TRUSS SPAN REDECKING DETAILS
	STANDARD SHEETS
116	AJ
117-120	TYPE C1W
121-122	PMDF
123	SEJ-M
124-126	TYPE T223
127	TRF

SHEET NO.	DESCRIPTION
	TRAFFIC
	STANDARD SHEETS
128	D & OM(1)-20
129	D & OM(2)-20
130	D & OM(3)-20
131	D & OM(4)-20
132	D & OM(6)-20
133	D & OM(VIA)-20
134	PM(1)-22
135	PM(2)-22
136	PM(3)-22
137	SMD(GEN)-08
138	SMD(SLIP-1)-08
139	SMD(SLIP-2)-08
140	SMD(SLIP-3)-08
141	SMD(TWT)-08
	ENVIRONMENTAL
142-143	STORMWATER POLLUTION PREVENTION PLAN(SWP3)
144-145	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
	STANDARD SHEETS
146	EC(1)-16
	RAILROAD
147	RAILROAD SCOPE OF WORK
	STANDARD SHEETS
148-149	RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

PATH: T:\YKMANNEX\PS&E\002701042_US90\Index_of_Sheets\
FILE: Index_of_Sheets.dgn
DATE: 3/29/2024

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

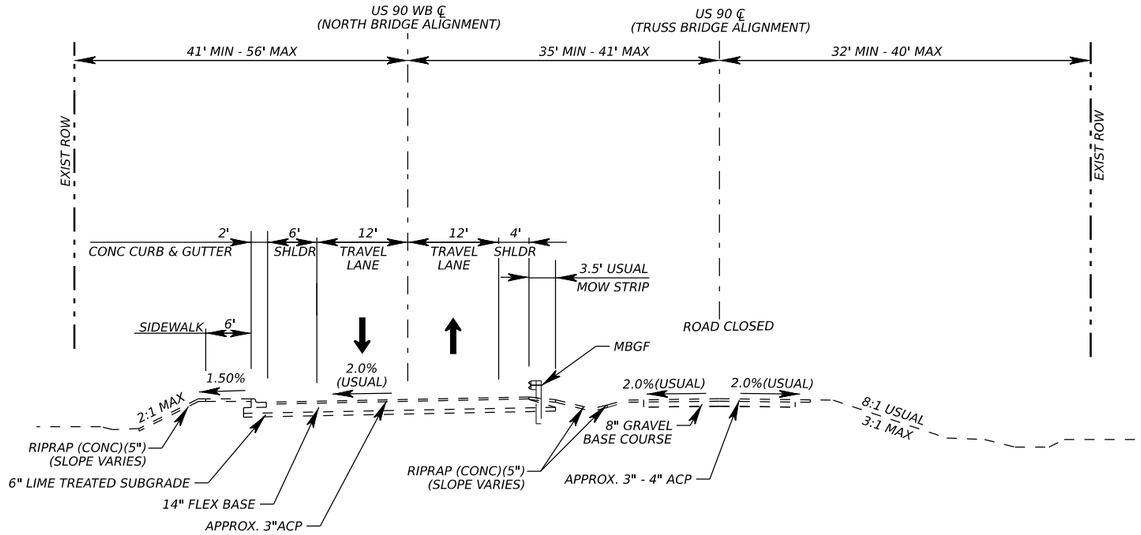
Amanda Anderle Fling, P.E.

03/26/2024

INDEX OF SHEETS

Texas Department of Transportation

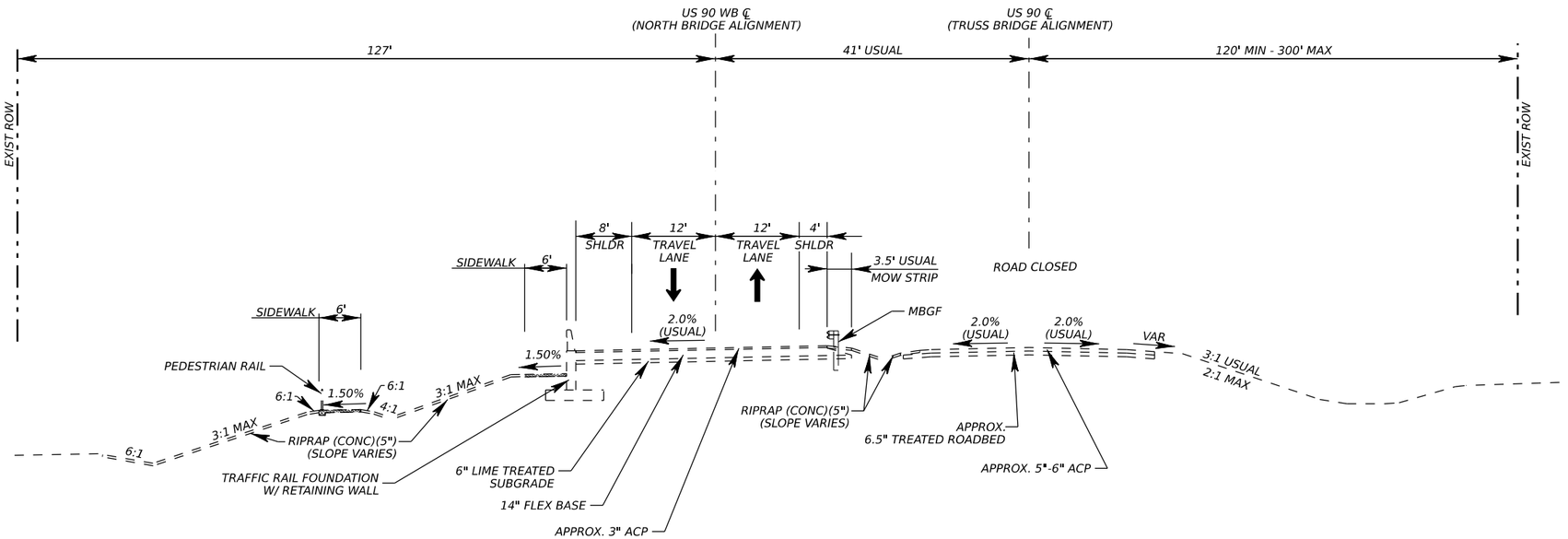
FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	2



EXISTING TYPICAL SECTION

①③ STA 7+33 TO STA 8+33.50

EXIST US 90 TRUSS BRIDGE FROM STA 8+33.50 TO STA 15+99.00.
EXIST US 90 WB BRIDGE FROM STA 58+40.07 TO STA 66+05.07.



EXISTING TYPICAL SECTION

② STA 15+99.00 TO STA 18+80

① STA 0+00 TO STA 1+80 (INCIDENTAL WORK, NO EXISTING TYPICAL SECTION SHOWN).
STA 0+00 TO STA 7+33 (NO EXISTING TYPICAL SECTION SHOWN).

② STA 18+80 TO STA 25+25 (NO EXISTING TYPICAL SECTION SHOWN).

③ US 90 ℄ (TRUSS BRIDGE ALIGNMENT) STA 7+33 = US 90 ℄ (NORTH BRIDGE ALIGMENT) STA 57+43.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

03/26/2024

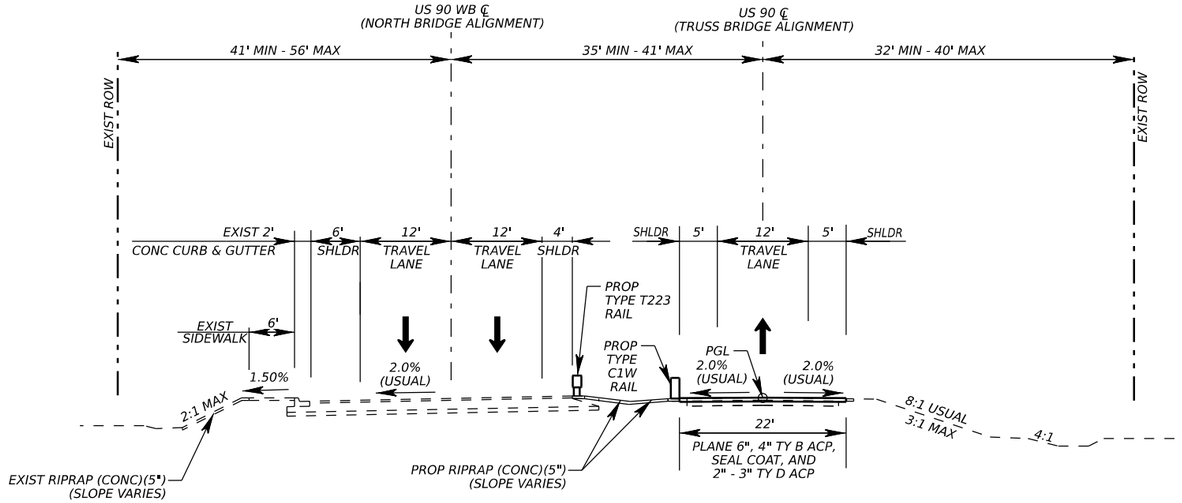
TYPICAL SECTIONS

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	3

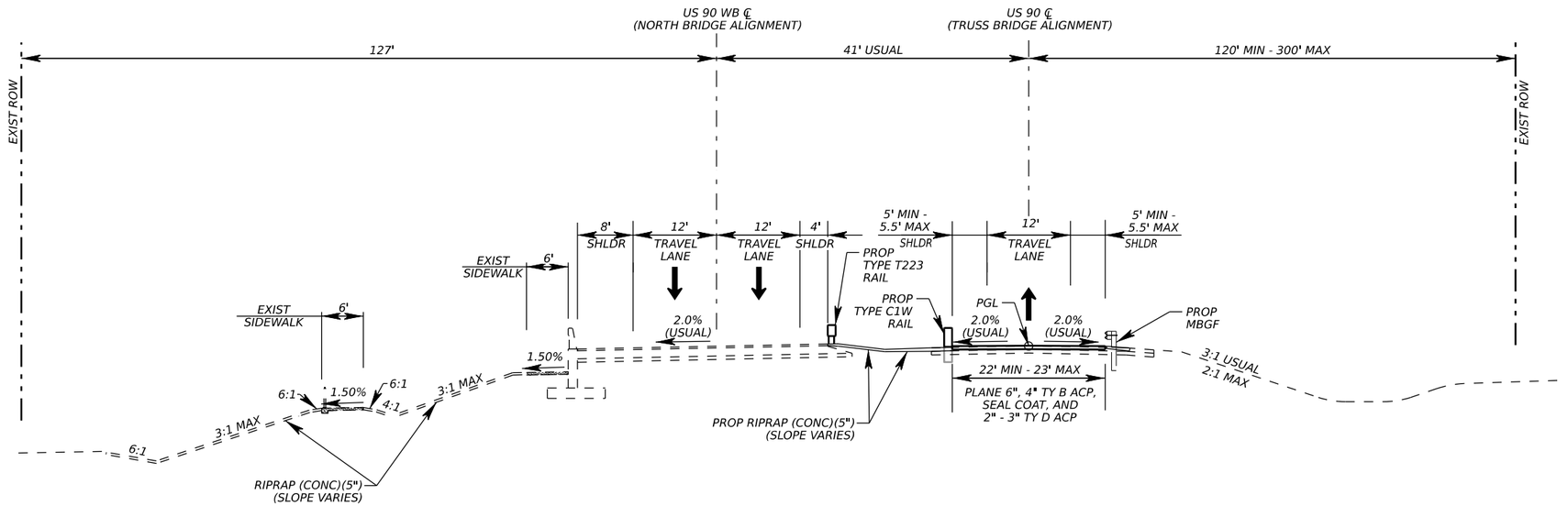
PATH: T:\YKM\ANNEX\PS&E\002701042_US90\Plan_Sheets\
FILE: TYPICAL SECTIONS.dgn
DATE: 3/27/2024



PROPOSED TYPICAL SECTION

① ③ STA 7+33 TO STA 8+33.50

EXIST US 90 TRUSS BRIDGE FROM STA 8+33.50 TO STA 15+99.00.
EXIST US 90 WB BRIDGE FROM STA 58+40.07 TO STA 66+05.07.



PROPOSED TYPICAL SECTION

② STA 15+99.00 TO STA 18+80

① STA 0+00 TO STA 1+80 (INCIDENTAL WORK - NO EXISTING TYPICAL SECTION SHOWN). STRIPING ONLY.
STA 0+00 TO STA 7+33 (NO EXISTING TYPICAL SECTION SHOWN). STRIPING ONLY.

② STA 18+80 TO STA 25+25 (NO EXISTING TYPICAL SECTION SHOWN). STRIPING ONLY.

③ US 90 ℄ (TRUSS BRIDGE ALIGNMENT) STA 7+33 = US 90 ℄ (NORTH BRIDGE ALIGMENT) STA 57+43.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

03/26/2024

TYPICAL SECTIONS

NOT TO SCALE

Texas Department of Transportation

SHEET 2 OF 2

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	4

PATH: T:\YKM\NNEX\PS&E\002701042_US90\Plan_Sheets\
FILE: TYPICAL SECTIONS.dgn
DATE: 3/27/2024

GENERAL:

Contractor questions on this project are to be addressed to the following individual(s):

Ryan Simper Ryan.Simper@txdot.gov
Paul Rodriguez Jr. Paul.Rodriguez@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals.

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address: https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

I. UNION PACIFIC RAILROAD COMPANY

PROTECTION OF FIBER OPTIC CABLE SYSTEMS

Fiber optic cable systems may be buried on the railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. The state and/or its contractor shall telephone the railroad during normal business hours (7:00 a.m. to 9:00 p.m., central time, Monday through Friday, except holidays) at 1-800-336-9193 (also a 24-hour, seven-day number for emergency calls) to determine if fiber optic cable is buried on the railroad's premises to be used by the state. If it is, the state and/or its contractor will telephone the telecommunications company(ies) involved, arrange for a cable locator and make arrangements for relocation or other protection of the fiber optic cable prior to beginning any work on the railroad's premises.

The Contractor’s attention is directed to the fact that companies have existing underground gas/oil facilities located within or near the project limits. Excavation and/or construction is prohibited without prior notification to these companies.

Project Number: **Sheet: 5**

County: COLORADO **Control: 0027-01-042**

Highway: US 90

Remove and dispose of existing raised pavement markers as directed. All work involved in the removal and disposal of these markers will not be paid for directly but shall be considered subsidiary to the various bid items involved.

In the removal of the surface and base material on the existing pavement, exercise extreme care in providing a smooth and uniform edge adjacent to the existing travelway pavement which is to remain in place.

The contractor will be required to plug all holes in existing storm sewer lines caused by the removal of incidental sewer appurtenances. Materials and method of plugging holes will be as approved or directed. No direct payment will be made for these materials and the work shall be considered subsidiary to the various bid items of the contract.

Install guard fence and/or railing on one side of the roadway at each location at one time through completion before work is begun on the other side of the roadway, unless directed otherwise.

Do not work on the roadway before sunrise or after sunset unless otherwise approved.

Leave all traffic lanes open to traffic at night, weekends and holidays unless otherwise approved.

Furnish a certified copy of the legal gross weight of each vehicle hauling materials by weight and certified measurements for all trucks hauling material by volume.

Leave all intersecting roadways, side streets, and entrances open during construction unless otherwise approved. Should there be a request to restrict access for such reasons as parallel culvert replacement, reconstruction, etc., approval will be required 48 hours in advance and the contractor will be required to coordinate satisfactorily with any affected property owners.

Unless otherwise approved, maintain a minimum safety clearance from the edge of the travelway for material stockpiled in proximity of traffic lanes based on the current average traffic count of the particular highway as follows:

0 - 1500 = 16 feet
Over 1500 = 30 feet

In the event the above requirements cannot be met, make arrangements to stockpile material off the right of way.

Provide temporary pipe drains or culverts and take such other measures as directed to provide for continued drainage from all abutting property, the right of way and the roadway during construction operations. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

The contractor shall field verify all existing pipe, box culvert, and safety end treatments sizes prior to fabrication of related items. All work involved with field verifying will not be measured or paid for directly but will be subsidiary to pertinent items.

ITEM 5: CONTROL OF THE WORK

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor."

ITEM 6: CONTROL OF MATERIALS

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

SPECIAL PROVISION TO ITEM 6:

As reported by Honesty Environmental Services, Inc. in the NESHAP Asbestos/Lead Inspection Report dated June 8, 2023, the green paint on the rail, truss, I-beam, and gas pipe has a lead content ranging from 0.005% to 2.6%.

Project Number: **Sheet: 6**

County: COLORADO **Control: 0027-01-042**

Highway: US 90

Provide for the safety and health of employees and abide by all OSHA standards and regulations when removing or disposing of painted steel. Remove painted elements in complete units. Do not saw or flame cut through painted areas. Obtain the Engineer's approval of the proposed removal process prior to removing steel elements. Per Item 446, the containment and disposal of hazardous materials (lead) on the truss is the responsibility of the contractor.

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

Notify the United States Coast Guard (USCG) for any temporary closures or alterations to navigability 60 days in advance of channel closure.

Notify the TxDOT Engineer immediately if any vessel makes contact with a TxDOT bridge.

The Contractor's attention is directed to the fact that discharge of permanent or temporary fill material into the waters of the United States (U.S.) including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

The Department will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and its potential to affect USACE jurisdictional areas. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. The Department will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits of this permit(s), then it becomes the Contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by the Department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The Contractor shall maintain near normal flow of any jurisdictional waters of the U.S. at all times during construction. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the TXDOT Yoakum District Environmental Coordinator.

If the Contractor elects to work on a structure when the stream is flowing, near normal flow shall be maintained by a method approved by the Engineer. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

If the contractor proposes work beyond the TxDOT obtained permit limitations, the contractor is responsible for additional costs, delays, and obtaining new or revised permits prior to construction.

ITEM 8: PROSECUTION AND PROGRESS

The 90 day convenience delayed start special provision is for allowing the contractor additional time for mobilizing crews and equipment to start this project.

Provide progress schedule as a Bar Chart.

ITEM 150: BLADING

Sprinkling and rolling which may be required during the operation of Item 150 will not be measured or paid for directly, but will be considered subsidiary to this item.

ITEM 302: AGGREGATES FOR SURFACE TREATMENTS

Furnish Type PE aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.

Furnish precoated aggregate that has a residual bitumen coating target value of 1.0% by weight.

ITEM 316: SEAL COAT

The asphalt application season for this project is May 1 to September 15. Use an Emulsion instead of an Asphalt Cement as approved when the surface treatment is placed between September 15 and May 1.

The asphalt application rate shown in the plans is an average between an Asphalt Cement and an Emulsion. The type of asphalt and application rate to be used will be as directed. The approximate application rate for Asphalt Cement with a Grade 3 aggregate is 0.32 Gal/SY and with a Grade 4 aggregate is 0.27 Gal/SY. The approximate application rate for an Emulsion with a Grade 3 aggregate is 0.48 Gal/SY and with a Grade 4 aggregate is 0.40 Gal/SY.

Project Number: **Sheet: 7**

County: COLORADO **Control: 0027-01-042**

Highway: US 90

Remove daily excess aggregate in developed or curb and gutter sections with a pickup broom or other method as approved and dispose of at an approved site.

Use two paper widths covering a minimum of five feet at the beginning of each shot to construct a straight transverse joint and to prevent overlapping of the asphalt.

ITEM 320: EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT

Provide a material transfer device capable of transferring mix from the haul trucks to the paver. Monitor its loading such that no damage is done to the existing pavement structures if a material transfer vehicle is used.

Securely attach a waterproof tarpaulin to the top of all trucks hauling ACP, to prevent air flow across the mix, for the duration of all ACP operations.

ITEM 351: FLEXIBLE PAVEMENT STRUCTURE REPAIR

The Engineer will select the locations. The repairs will consist of the removal of existing subgrade, base and surfacing and replacement with asphaltic concrete pavement conforming to Item 3076, Dense Graded Hot-Mix Asphalt (Exempt), Type B, PG 64-22. All work and materials required to bring the repaired pavement section to its desired depth will be considered subsidiary to the item “Flexible Pavement Structure Repair”.

ITEM 354: PLANING AND TEXTURING PAVEMENT

Use caution when planing adjacent to existing manhole, water valves, water meters, etc. Remove pavement that is not removed by the planing machine by other methods as approved. Damage due to the removal method will be repaired by the contractor at his entire expense using an approved method.

ITEM 427: SURFACE FINISHES FOR CONCRETE

Provide Surface Area II, railing, and culvert headwalls and wingwalls with a Slurry Coat Finish per 427.4.3.2 for cast-in-place concrete surfaces.

ITEM 432: RIPRAP

Place 1/2 inch expansion joint material between the two concrete areas or structures where riprap is placed against other concrete such as concrete pavement and structures unless otherwise shown on the plans or as directed. This work will not be paid for directly but will be subsidiary to the pertinent items.

Unless otherwise shown on the plans or directed, riprap will be 5" deep and reinforced; reinforced toewalls 6" wide and 12" deep will be placed around the perimeter of each location.

The dimension as shown in the stone protection bid item description is the stone size as described in the specification. The required thickness will be as shown elsewhere in the plans.

Extend the concrete mow strip five feet in front of the guardrail end treatment. This will be paid for under Item 432 Riprap (Mow Strip).

ITEM 446: FIELD CLEANING AND PAINTING STEEL

Existing truss has lead paint. Treat as hazardous materials and comply with requirements of Item 6 and Item 446. For System III-A paint system, substitute a Type III (Water-Cleanable) Anti-Graffiti Coating in accordance with DMS-8111, “Anti-Graffiti Coatings,” for the System III-A appearance coat. Submit the proposed anti-graffiti coating to the Engineer for approval. Non-recycled abrasive cleaning meeting SSPC AB 1 are allowed per the Special Provision issued for Item 446. QP 7 certification is permitted for this project.

Proposed paint color shall closely resemble the existing bridge paint color of Green. The Federal Standard 595 Paint Spec RGB Hex Code FS number will be determined prior to construction and used as a base color guide for choosing an approved color and material producer. Engineer will approve final color choice before application begins.

ITEMS 451 or 496: RETROFIT RAILING/REMOVING STRUCTURES

Remove the metal railing elements found to contain lead. Remove the railing by unbolting, do not use flame cutting or any other method that would cause existing paint to vaporize. Remove and dispose of railing in complete, existing length sections.

Project Number: **Sheet: 8**

County: COLORADO **Control: 0027-01-042**

Highway: US 90

Remove rail flush with top of existing concrete. Concrete shall be recessed around all exposed reinforcing ends. Trim projecting reinforcing ends 1/2” below the sawcut surface. Clean all loose debris from the sawcut surface, recesses and exposed reinforcing areas. Coat the exposed reinforcing ends with a corrosion inhibiting bond agent. Fill recess with non-shrink grout. (A grout containing a corrosive inhibitor may, with approval, be used in place of separate inhibitor and grout.)

ITEM 454: BRIDGE EXPANSION JOINTS

Use Type 1 elastomeric concrete for bridge joint systems.

The steel components of the sealed expansion joint shall be galvanized in accordance with Item 445 “Galvanizing.”

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

The Contractor Force Account “Safety Contingency” that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor’s Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Law enforcement assistance for this project will be required, as approved, for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement in a marked vehicle as approved by the Engineer. Complete the daily tracking form provided by the department, including all signatures, and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Use WZ(RS)-22 in conjunction with TCP(2-2).

Use TCP(2-2b) for one-lane, two-way traffic control.

When using TCP(2-2b), a pilot car is required to lead traffic through the work space with or without channelizing devices on the center line unless otherwise approved.

When using TCP(2-2b), channelizing devices may be omitted during base, subgrade and seal coat operations unless otherwise directed. Flaggers will be required at public intersections when channelizing devices are omitted.

When using TCP(2-2b), arrow boards, displaying the caution mode, may be used to enhance the flagger stations. If used, place the arrow board in advance of the flagger station a distance of ½X, the sign spacing distance shown on BC(2). Use arrow boards as shown on BC(7).

When using TCP(2-2b), the temporary 24" stop line and the CW16-2P plaques may be omitted.

When using TCP(2-2b), an additional “Road Work Ahead” and “Be Prepared To Stop” signs will be required on each end of the lane closure unless otherwise approved.

Provide trail and lead vehicles when using TCP(3-1) or TCP(3-3).

Utilize TCP(3-3) for sweeping operations or for installing and removing tabs or raised pavement markers.

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

No additional payment will be made for relocating existing sign assemblies to temporary mounts.

Place plastic drums along the gutter line at curb ramp locations during non-working hours and barricades with "Sidewalk Closed" signs while ramps and/or sidewalks are under construction.

Signs warning of temporary conditions, such as “NO CENTER LINE,” “LOOSE GRAVEL,” etc., shall only be displayed when conditions are present. Remove or completely cover signs that do not apply to the roadway conditions. These signs may be installed prior to beginning work but shall remain completely covered until the signs are applicable.

In accordance with Article 502.4.2, no payment will be made for the month if the contractor fails to provide or properly maintain signs in compliance with the contract requirements. Temporary warning signs that are visible when conditions do not apply will be considered improper maintenance of signs.

Project Number: **Sheet: 9**

County: COLORADO **Control: 0027-01-042**

Highway: US 90

ITEM 504: FIELD OFFICE AND LABORATORY

Provide a Type D structure for the asphalt mix control laboratory for the engineer's exclusive use. Equip the structure with a 240 volt electrical entrance service. The service will consist of a minimum of four 120 volt circuits with 20 amp breakers and at most two grounded convenience outlets per circuit and provisions for a minimum of two 220 volt ovens. Space heaters for heating the structure are unacceptable. Portable structures will be support blocked for stability and will be tied down.

ITEM 506: TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

1. See SWP3 plan sheet for total disturbed acreage.

2. The disturbed area in this project, all project locations in the contract, and contractor project specific locations (PSLs), within one (1) mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges.

3. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans.
4. Obtain any required authorization from the TCEQ for any contractor PSLs for construction activities on or off right-of-way (ROW).

5. When the total disturbed area for all projects in the contract and PSLs within one (1) mile of the project limits exceeds five (5) acres, provide a copy of the contractor NOI.

6. Provide a signed sketch detailing the location of any contractor’s PSLs on ROW or within one (1) mile of the project.

ITEM 540: METAL BEAM GUARD FENCE

Furnish and install only one type of timber post at each location.

Furnish Type II rail elements at all locations.

ITEMS 540 & 544: METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

ITEM 545: CRASH CUSHION ATTENUATORS

Use either the ABSORB-19 or SLED-19 crash cushion attenuators.

Use either the SMTC or QUADGUARD mash compliant crash cushion attenuators to protect the ends of the permanent concrete traffic barrier. The test level for this attenuator is TL-3. Areas damaged due to the installation or removal of the crash cushion attenuators shall be restored to the proposed pavement section. This includes the removal of foundation pads if required. This work shall be considered subsidiary to Item 545.

Crash cushion attenuators are not to be salvaged, but are to remain the property of the contractor.

Crash cushion attenuator foundations shall be reinforced concrete as shown on applicable standards..

ITEM 644: SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES

Use Class B concrete for all small roadside sign assembly concrete footings.

The exact location of the foundations to be placed will be determined in the field by the Engineer.

Replace the signs with reference markers to the exact station from which they were removed.

Drill the holes in the signs carefully as to not damage the reflective sheeting of the signs.

Install the wedge anchor system in a concrete footing 42" in depth and 12" in diameter. Foundation should take approximately 2.7 cubic feet of concrete.

Project Number: **Sheet: 10**

County: COLORADO **Control: 0027-01-042**

Highway: US 90

ITEM 662: WORK ZONE PAVEMENT MARKINGS

Use raised pavement markers for removable work zone pavement markings.

Remove the exposed portions of the temporary flexible reflective roadway marker tabs after raised pavement markers are installed. If the tabs are not in line with the markings, remove the tabs immediately after the centerline markings are installed.

ITEM 666: REFLECTORIZED PAVEMENT MARKINGS

Use a mobile retroreflectometer to measure retroreflectivity unless otherwise directed. A DVD video of the retroreflectometer data will not be required.

Place permanent pavement markings within 7 calendar days of initial tab placement on ACP. Provide Type I pavement markings in accordance with this item. The requirements of this item are supplemented with the following provision: Place Type I pavement markings with a ribbon-gun application. All other provisions remain in effect.

Retroreflectivity testing is required for all profile striping.

ITEM 668: PREFABRICATED PAVEMENT MARKINGS

Pavement marking material may be placed on roadways at any time during the year, subject to temperature and moisture limitations specified.

ITEM 677: ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS

Remove existing stripe with the water blasting method.

ITEM 3076: DENSE-GRADED HOT-MIX ASPHALT

Mixture designs, using the PG binder originally specified and without additives, failing to meet the requirements of Table 10 will require the addition of a minimum 1.0% of Type A hydrated lime based on dry weight of the total aggregate.

Use of RAS in the HMACP surface course is not permitted.

Do not add additional quantity of RAP to stockpiles tested and approved. If additional RAP is added to a stockpile, a new design and trial batch will be required prior to placement on the roadway.

The extracted aggregate from contractor-owned RAP shall have a minimum of 85% two crushed faces when tested in accordance with TEX-460-A, Part I.

Limit uneven pavement to two days production with the requirement that all longitudinal joints adjacent to a travelway are constructed with a joint maker providing a maximum one inch vertical edge (1/2” desirable) with an adjacent 6:1 taper.

ITEM 6185: TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)

Shadow vehicle(s) with TMA are set up for stationary and/or mobile operations. The contractor will be responsible for determining if operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0027-01-042 **DISTRICT** Yoakum **COUNTY** Colorado
HIGHWAY US 90

			CONTROL SECTION JOB		**0027-01-042**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00068426**		
			COUNTY		**Colorado**		
			HIGHWAY		**US 90**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	150-6002	BLADING	HR	10.000		10.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	104.000		104.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	26.000		26.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	26.000		26.000	
	168-6001	VEGETATIVE WATERING	MG	0.870		0.870	
	316-6249	AGGR(TY-PE GR-4 SAC-B)	CY	7.000		7.000	
	316-6542	ASPH (AC 20-5TR OR AC-20XP OR CRS-2P)	GAL	322.000		322.000	
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	SY	100.000		100.000	
	354-6049	PLANE ASPH CONC PAV (6")	SY	949.000		949.000	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY	52.100		52.100	
	422-6001	REINF CONC SLAB	SF	17,858.000		17,858.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	200.000		200.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	24.000		24.000	
	432-6046	RIPRAP (MOW STRIP)(5 IN)	CY	3.300		3.300	
	442-6008	STR STEEL (MISCELLANEOUS BRIDGE)	LB	100.000		100.000	
	442-6009	STR STEEL (DIAPHRAGM & STIFFENER)	LB	8,415.000		8,415.000	
	442-6010	STR STEEL (SHEAR CONNECTOR)	LB	19,361.000		19,361.000	
	442-6023	STR STEEL (MISC NON-BRIDGE TYPE 1)	EA	1.000		1.000	
	446-6029	CLEAN AND PAINT EXIST STR (REF NO.1)	LS	1.000		1.000	
	446-6030	CLEAN AND PAINT EXIST STR (REF NO.2)	LS	1.000		1.000	
	446-6031	CLEAN AND PAINT EXIST STR (REF NO.3)	LS	1.000		1.000	
	450-6006	RAIL (TY T223)	LF	176.660		176.660	
	450-6029	RAIL (TY C1W)	LF	1,735.100		1,735.100	
	454-6004	ARMOR JOINT (SEALED)	LF	69.000		69.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	92.000		92.000	
	481-6011	PIPE (PVC) (SCH 40) (4 IN)	LF	341.000		341.000	
	496-6058	REMOV STR (BRIDGE SLAB)	LF	765.500		765.500	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	10.000		10.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	200.000		200.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	200.000		200.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	330.000		330.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	120.000		120.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	450.000		450.000	
	530-6005	DRIVEWAYS (ACP)	SY	30.000		30.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	25.000		25.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0027-01-042 **DISTRICT** Yoakum **COUNTY** Colorado
HIGHWAY US 90

			CONTROL SECTION JOB		**0027-01-042**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00068426**		
			COUNTY		**Colorado**		
			HIGHWAY		**US 90**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	300.000		300.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		1.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	3.000		3.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	4.000		4.000	
	545-6007	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)	EA	1.000		1.000	
	545-6010	CRASH CUSH ATTEN (INSTL)(L)(W)(TL3)	EA	2.000		2.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	4.000		4.000	
	636-6009	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	14.000		14.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	6.000		6.000	
	644-6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	12.000		12.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	16.000		16.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	3.000		3.000	
	662-6064	WK ZN PAV MRK REMOV (W)6"(BRK)	LF	544.000		544.000	
	662-6067	WK ZN PAV MRK REMOV (W)6"(SLD)	LF	3,880.000		3,880.000	
	662-6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	490.000		490.000	
	662-6098	WK ZN PAV MRK REMOV (Y)6"(SLD)	LF	5,410.000		5,410.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	272.000		272.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	490.000		490.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	544.000		544.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	3,880.000		3,880.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	5,410.000		5,410.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	110.000		110.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	3.000		3.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	3.000		3.000	
	668-6108	PREFAB PAV MRK TY C (Y) (24") (SLD)	LF	443.000		443.000	
	672-6007	REFL PAV MRKR TY I-C	EA	80.000		80.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	272.000		272.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	9,413.000		9,413.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	635.000		635.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	200.000		200.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	70.000		70.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	3.000		3.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	3.000		3.000	
	778-6024	CONCRETE POST REPLACEMENT	EA	90.000		90.000	
	778-6076	CONCRETE RAIL REPLACEMENT (IN-KIND)	LF	520.000		520.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0027-01-042 **DISTRICT** Yoakum **COUNTY** Colorado
HIGHWAY US 90

		CONTROL SECTION JOB		**0027-01-042**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00068426**			
		COUNTY		**Colorado**			
		HIGHWAY		**US 90**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	784-6004	REP STL BRIDGE MEMBER (TRUSS VERTICAL)	EA	2.000		2.000	
	784-6005	REP STL BRIDGE MEMBER (TRUSS DIAGONAL)	EA	3.000		3.000	
	784-6006	REP STL BRIDGE MEMBER(TRUSS SWAY BRACE)	EA	7.000		7.000	
	784-6011	REP STL BRIDGE MEMBER (BOTTOM CHORD)	EA	10.000		10.000	
	784-6012	REP STL BRIDGE MEMBER (TOP CHORD)	EA	1.000		1.000	
	784-6013	REP STL BRIDGE MEMBER (ENDPOST)	EA	12.000		12.000	
	784-6021	REP STL BRDG MEMB (TRUSS PORTAL BRACE)	EA	3.000		3.000	
	784-6022	REP STL BRIDGE MEMBER (FLOORBEAM)	EA	9.000		9.000	
	784-6028	REP STL BRIDGE MEMBER (STRINGER)	EA	3.000		3.000	
	784-6032	REP STL BRIDGE MEMBER (GUSSET CON)	EA	18.000		18.000	
	784-6034	REP STL BRIDGE MEMBER(STRAIGHTEN MEMB)	EA	16.000		16.000	
	784-6038	REP STL BRIDGE MEMBER(REPL RIVET/BOLT)	EA	13,500.000		13,500.000	
	3076-6001	D-GR HMA TY-B PG64-22	TON	209.000		209.000	
	3076-6042	D-GR HMA TY-D SAC-B PG70-22	TON	130.000		130.000	
	6185-6002	TMA (STATIONARY)	DAY	6.000		6.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	6.000		6.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

ROADWAY SUMMARY

ROADWAY WIDTH		LOCATION			ITEM 354	ITEM 316		ITEM 530	ITEM 3076	ITEM 3076	REMARKS
BEGIN WIDTH FT	END WIDTH FT	BEGIN STA	END STA	LENGTH FT	PLANE ASPH CONC PAV 6" SY	ASPH (AC 20-5TR OR AC-20XP OR CRS-2P) 0.34 GAL/SY GAL	AGGR (TY-PE GR-4 SAC-B) 1 CY/130SY CY	DRIVEWAYS (ACP) SY	D-GR HMA TY B PG64-22 4" TON	D-GR HMA TY D SAC-B PG70-22 (2" - 3") TON	
22	22	7+33	8+33.50 ①	100.50	246	83.5	1.9		54.0	33.8	US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
23	22	①15+99.00	18+80	281.00	703	238.9	5.4		154.6	96.6	US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
DRIVEWAY 7+70 RT (30 SY EST) ③								30			US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
TOTALS					**949**	**322**	**7**	**30**	**209**	**130**	

LOCATION	ITEM 351 FLEXIBLE PAVEMENT STRUCTURE REPAIR (8") (EST) SY	REMARKS
LOCATIONS AS DETERMINED BY THE ENGINEER IN THE FIELD.	100	
TOTALS	**100**	

NOTES:

① EXIST US 90 TRUSS BRIDGE FROM STA 8+33.50 TO STA 15+99.00.

② EXIST US 90 WB BRIDGE FROM STA 58+40.07 TO STA 66+05.07.

③ PLACE SEAL COAT AND 2" TY D ACP TO THE ROW LINE AT DRIVEWAY STA 7+70 RT. DIMENSION OF DRIVEWAY IS TYPICAL AND MAY VARY DURING ACTUAL CONSTRUCTION TO MEET FIELD CONDITIONS AND MATCH EXISTING DRIVEWAY. THE TYPES OF MATERIALS SHALL CONFORM TO THE ROADWAY ITEMS. ALL WORK TO CONSTRUCT DRIVEWAY IS CONSIDERED SUBSIDIARY TO ITEM 530.

TRAFFIC CONTROL SUMMARY

DESCRIPTION	ITEM 662					ITEM 677						ITEM 6185		REMARKS
	WK ZN PAV MRK REMOV (W)6"(BRK) LF	WK ZN PAV MRK REMOV (W)6"(SLD) LF	WK ZN PAV MRK REMOV (W)8"(SLD) LF	WK ZN PAV MRK REMOV (Y)6"(SLD) LF	WK ZN PAV MRK SHT TERM (TAB) TY Y-2 EA	ELIM EXT PAV MRK & MRKS (4") LF	ELIM EXT PAV MRK & MRKS (8") LF	ELIM EXT PAV MRK & MRKS (12") LF	ELIM EXT PAV MRK & MRKS (24") LF	ELIM EXT PAV MRK & MRKS (ARROW) EA	ELIM EXT PAV MRK & MRKS (WORD) EA	TMA (STATIONARY) DAY	TMA (MOBILE OPERATION) DAY	
CENTERLINE/INSIDE EDGE LINES				5410	272	5410								(TAB)TY Y-2 = 2 EA / 20 LF
EASTBOUND LANE/EDGELINES		2050	490			2215	635	200	70	3	3	6	6	
WESTBOUND LANE/EDGELINES	544	1830				1788								
TOTALS	**544**	**3880**	**490**	**5410**	**272**	**9413**	**635**	**200**	**70**	**3**	**3**	**6**	**6**	

PAVEMENT MARKING SUMMARY

DESCRIPTION	ITEM 666				ITEM 668				ITEM 672		REMARKS
	RE PM W/ RET REQ TY I (W)6"(BRK) (090MIL) LF	RE PM W/ RET REQ TY I (W)6"(SLD) (090MIL) LF	RE PM W/ RET REQ TY I (Y)6"(SLD) (090MIL) LF	REFL PAV MRK TY I (Y)8"(SLD) (090MIL) LF	PREFAB PAV MRK TY C (Y)(24") (SLD) LF	PREFAB PAV MRK TY C (W)(24") (SLD) LF	PREFAB PAV MRK TY C ④ (W) (ARROW) EA	PREFAB PAV MRK TY C ④ (W) (WORD) EA	REFL PAV MRKR TY II-A-A EA	REFL PAV MRKR TY I-C EA	
CENTERLINE/INSIDE EDGELINES & GORE			5410		443				272		(Y)6"(DBL) REFL PAV MRKR TY II-A-A = 2 EA / 20 LF
EASTBOUND LANE/EDGELINES		2050		490		110	3	3		25	REFL PAV MRKR TY I-C = 1 EA / 20 LF
WESTBOUND LANE/EDGELINES	544	1830								55	(W)6"(BRK) = 10 LF/40 LF - REFL PAV MRKR TY I-C = 1 EA / 40 LF
TOTALS	**544**	**3880**	**5410**	**490**	**443**	**110**	**3**	**3**	**272**	**80**	

④ LOCATIONS TO BE DETERMINED BY THE ENGINEER IN THE FIELD.

MISCELLANEOUS SUMMARY

LOCATION	ITEM 150	ITEM 164			ITEM 166	ITEM 168	ITEM 506		REMARKS
	BLADING (EST) HR	BROADCAST SEED (PERM) (RURAL) (SANDY) SY	BROADCAST SEED (TEMP) (WARM) SY	BROADCAST SEED (TEMP) (COOL) SY	** FERTILIZER 500 LBS/AC TON	VEGETATIVE WATERING (13.6 MG/AC x 3 CYCLES) MG	TEMP SEDMT CONT FENCE (INSTALL) (EST) LF	TEMP SEDMT CONT FENCE (REMOVE) (EST) LF	
STA 4+00 TO STA 5+50 LT & RT		36	9	9	0.01	0.30			US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
STA 5+50 TO STA 7+00 LT		68	17	17	0.01	0.57			US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
PROJECT LIMITS - EST	10								
LOCATIONS AND QUANTITIES AS DIRECTED OR APPROVED BY ENGINEER IN THE FIELD.							200	200	
TOTALS	**10**	**104**	**26**	**26**	0.02	**0.87**	**200**	**200**	

** FOR CONTRACTOR'S INFORMATION ONLY.

PATH: T:\YKMANNEX\PS&E\002701042_US90\Plan_Sheets\
FILE: MISCELLANEOUS SUMMARIES AND DETAILS.dgn
DATE: 3/29/2024

MISCELLANEOUS SUMMARIES AND DETAILS

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	15

CTB SUMMARY

LOCATION	ITEM 512			ITEM 545		REMARKS
	PORT CTB (FUR & INST) (SGL SLOPE) (TY 1) LF	PORT CTB (MOVE) (SGL SLP) (TY 1) LF	CTB (REMOVE) (SGL SLP) (TY 1) LF	CRASH CUSH ATTEN (INSTL)(S) (N)(TL3) EA	CRASH CUSH ATTEN (REMOVE) EA	
STA 57+07 TO STA 58+57 RT	90	60	150	2	2	US 90 WB ℄ (NORTH BRIDGE ALIGNMENT)
STA 65+86 TO STA 68+86 RT	240	60	300	2	2	US 90 WB ℄ (NORTH BRIDGE ALIGNMENT)
TOTALS	**330**	**120**	**450**	**4**	**4**	

NOTES:

1. THE "CTB SUMMARY" FOR "FURNISH & INSTALL", "MOVE", AND "REMOVE" QUANTITY OF PORTABLE CONCRETE TRAFFIC BARRIER IS BASED ON INSTALLING GUARD FENCE AND/OR RAILING ON ONE SIDE OF THE ROADWAY AT THE LOCATION THROUGH COMPLETION.
2. PLACE THE PORTABLE CONCRETE TRAFFIC BARRIER ON THE SHOULDER AT THE OFFSET SHOWN IN THE PLANS UNLESS OTHERWISE DIRECTED.
3. IF THE CONTRACTOR ELECTS TO DEVIATE FROM THE ABOVE SEQUENCE, IT WILL BE AT THE EXPENSE OF THE CONTRACTOR.

RAIL SUMMARY

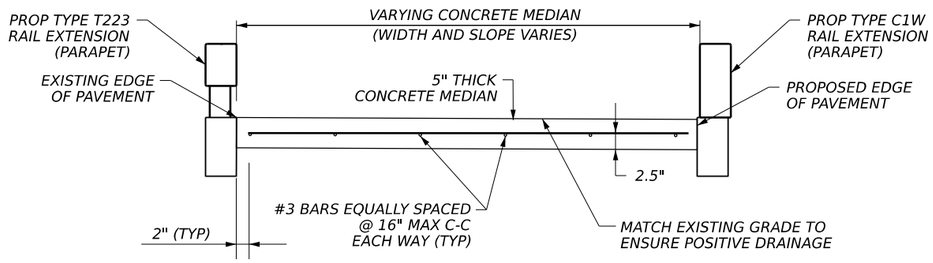
LOCATION	ITEM 420	ITEM 432		ITEM 450		ITEM 540		ITEM 542		ITEM 544		ITEM 545		ITEM 658		REMARKS
	① CL C CONC (RAIL FOUNDATION) CY	RIPRAP CONC (5 IN) CY	RIPRAP (MOW STRIP) (5 IN) CY	RAIL (TY C1W) ① (EST) LF	RAIL (TY T223) ① LF	MTL W-BEAM GD FEN (TIM POST) LF	MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	REMOVE METAL BEAM GUARD FENCE LF	REMOVE TERMINAL ANCHOR SECTION EA	GUARDRAIL END TREATMENT (INSTALL) EA	GUARDRAIL END TREATMENT (REMOVE) EA	CRASH CUSHION ATTEN (INSTL)(L) (N)(TL3) EA	CRASH CUSHION ATTEN (INSTL)(L) (W)(TL3) EA	INSTL DEL ASSM (D-SY)SZ BRF CTB EA	INSTL DEL ASSM (D-SW)SZ1 BRF GF2 EA	
STA 57+80.24 TO STA 58+29.07 RT	6.8				48.83			56.25			1			3		US 90 WB ℄ (NORTH BRIDGE ALIGNMENT) OR STA 7+77.50 TO STA 8+22.50 LT ALONG US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
STA 7+77.50 TO STA 8+33.50 LT	8.6	7.6		61.28②									1	3		US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
STA 7+94 TO STA 8+33.50 RT								25	1			1				US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
STA 66+16.07 TO STA 68+05 RT	17.9				127.83			143.75			1			5		US 90 WB ℄ (NORTH BRIDGE ALIGNMENT) OR STA 16+09.50 TO STA 17+38.50 LT ALONG US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
STA 16+09.50 TO STA 17+38.50 LT	18.8	16.4		134.41②									1	5		US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
STA 15+99.00 TO STA 16+92.75 RT			3.3			25	1	75		1	1				3	US 90 ℄ (TRUSS BRIDGE ALIGNMENT)
TOTALS	**52.1**	**24.0**	**3.3**	195.69 ②	**176.66**	**25**	**1**	**300**	**1**	**1**	**3**	**1**	**2**	**16**	**3**	

① SEE "US 90 PLAN" SHEETS AND "RAIL END TREATMENT DETAILS" SHEETS FOR MORE INFORMATION.

② QUANTITY OF RAIL (TY C1W) IS PAID FOR UNDER ITEM 450-6029 ON "ESTIMATED QUANTITIES" SHEET. QUANTITY ON "MISCELLANEOUS SUMMARIES AND DETAILS" SHEET IS FOR CONTRACTOR'S INFORMATION ONLY.

③ EXIST US 90 TRUSS BRIDGE FROM STA 8+33.50 TO STA 15+99.00.

④ EXIST US 90 WB BRIDGE FROM STA 58+40.07 TO STA 66+05.07.



US 90 CONCRETE MEDIAN DETAIL

NOT TO SCALE

NOTE: SEE "US 90 PLAN" SHEETS FOR MORE INFORMATION.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

03/26/2024

MISCELLANEOUS SUMMARIES AND DETAILS

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	16

PATH: T:\YKMANNEX\PS&E\002701042_US90\Plan_Sheets\
FILE: MISCELLANEOUS SUMMARIES AND DETAILS.dgn
DATE: 3/29/2024

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

Post Type: FRP = Fiberglass; TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80

Posts (1 or 2)

Anchor Type: UA = Univer-Conc; UB = Univer-Bolt; WS = Wedge-Steel; SA = Slip-Conc; SB = Slip-Bolt

Mounting Designation: P = Prefab. "Plain" T = Prefab. "T" U = Prefab. "U"

1EXT or 2EXT = # of Ext. BM = Extruded Wind Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. signs

SIGN NO.	EXISTING LOCATION STATION	PROPOSED LOCATION STATION	SIGN NOMENCLATURE	TEXT SIGN	SIGN DIMEN. W x H	Post Type	Posts (1 or 2)	Anchor Type	Mounting Designation	1EXT or 2EXT	ITEM 636: REPLACE EXISTING ALUMINUM SIGNS (TY O) SF	ITEM 644: IN SM RD SN SUP & AM TWT (1)WS (P) EA	ITEM 644: IN SM RD SN SUP & AM TWT (1)WS (T) EA	ITEM 644: REMOVE SM RD SN SUP&AM EA	REMARKS
1	1+50 RT		W9-2TL	LANE ENDS MERGE LEFT	36 x 36									1	
2		1+50 RT	R3-7R	RIGHT LANE MUST TURN RIGHT	36 x 36	TWT	1	WS	P			1			
3		6+50 RT	W12-2	X' - X" LOW CLEARANCE	36 x 36	TWT	1	WS	P			1			
4	6+80 RT			BARRICADES/ OBJECT MARKERS										1	(1)
5	7+45 LT	7+45 RT	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	TWT	1	WS	P			1		1	RE-USE SIGN FACE
6	7+87			BARRICADES/ OBJECT MARKERS										1	(1)
7	7+90 LT	7+90 RT	R2-1	SPEED LIMIT 45	30 x 36	TWT	1	WS	P			1		1	RE-USE SIGN FACE
8	8+28 LT	8+15 RT	I-3	COLORADO RIVER	48 x 18	TWT	1	WS	T				1	1	RE-USE SIGN FACE
9	8+88	8+88	W12-2a	X' - X"	84 x 24						14			1	
10	13+88		W12-2a	15' - 8"	84 x 24									1	
11	16+20 LT		W1-4R	REVERSE CURVE (SYMBOL)	36 x 36									1	
12	19+45 LT	19+45 RT	R2-1	SPEED LIMIT 55	30 x 36	TWT	1	WS	P			1		1	RE-USE SIGN FACE
13	19+67			BARRICADES/ OBJECT MARKERS										1	(1)
14	21+55 LT	21+55 RT	R1-1	STOP	36 x 36	TWT	1	WS	P			1		1	RE-USE SIGN FACE
											PROJECT TOTALS	**6**	**1**	**12**	

(1) THE REMOVAL OF EXISTING BARRICADE(S) AND OBJECT MARKERS ARE SUBSIDARY TO ITEM 644, "SMALL ROADSIDE SIGN ASSEMBLIES".

PATH: T:\YKMANNEX\PS&E\002701042_US90\Signs&Striping\
FILE: SUMMARY OF SMALL SIGNS.dgn
DATE: 3/28/2024

SUMMARY OF SMALL SIGNS

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	17

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1	CTB LAYOUT	19	SEE "US 90 CTB LAYOUT" SHEET.	57+07 RT	TL-3	BI	SEE STANDARD	SEE STANDARD	PORT CTB	SEE STANDARD	SEE STANDARD	50′	1	1							X	
2	CTB LAYOUT	19	SEE "US 90 CTB LAYOUT" SHEET.	58+57 RT	TL-3	BI	SEE STANDARD	SEE STANDARD	PORT CTB	SEE STANDARD	SEE STANDARD	100	1	1							X	
3	CTB LAYOUT	19	SEE "US 90 CTB LAYOUT" SHEET.	65+86 RT	TL-3	BI	SEE STANDARD	SEE STANDARD	PORT CTB	SEE STANDARD	SEE STANDARD	100′	1	1							X	
4	CTB LAYOUT	19	SEE "US 90 CTB LAYOUT" SHEET.	68+86 RT	TL-3	BI	SEE STANDARD	SEE STANDARD	PORT CTB	SEE STANDARD	SEE STANDARD	100′	1	1								
5	PERMANENT	50	SEE "US 90 PLAN" SHEET.	7+77.50 LT	TL-3	BI	SEE STANDARD	SEE STANDARD	CRASH CUSHION WALL. SEE "RAIL END TREATMENT DETAILS" SHEET FOR MORE INFORMATION.	SEE STANDARD	SEE STANDARD	100′	1					X				
6	PERMANENT	50	SEE "US 90 PLAN" SHEET.	8+33.50 RT	TL-3	BI	SEE STANDARD	SEE STANDARD	SEE "RAIL END TREATMENT DETAILS" SHEET FOR MORE INFORMATION.	SEE STANDARD	SEE STANDARD	40′	1				X					
7	PERMANENT	50	SEE "US 90 PLAN" SHEET.	17+38.50 LT	TL-3	BI	SEE STANDARD	SEE STANDARD	CRASH CUSHION WALL. SEE "RAIL END TREATMENT DETAILS" SHEET FOR MORE INFORMATION.	SEE STANDARD	SEE STANDARD	100′	1					X				
												TOTALS	7	4								

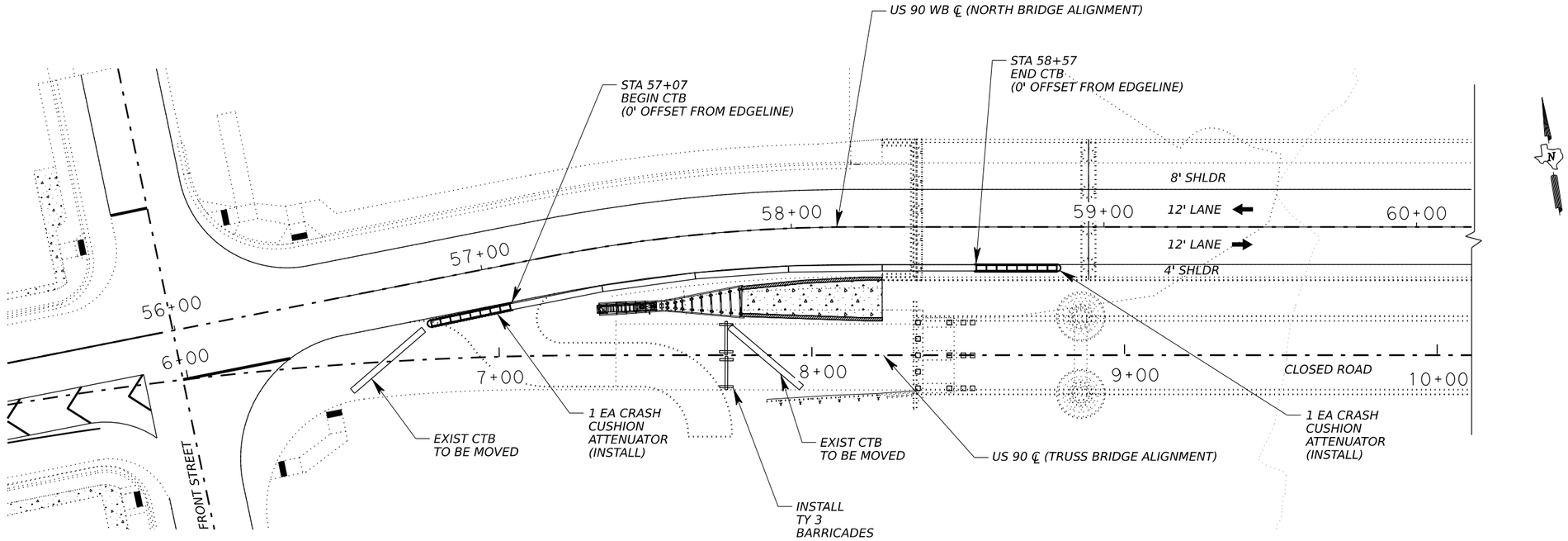
LEGEND:

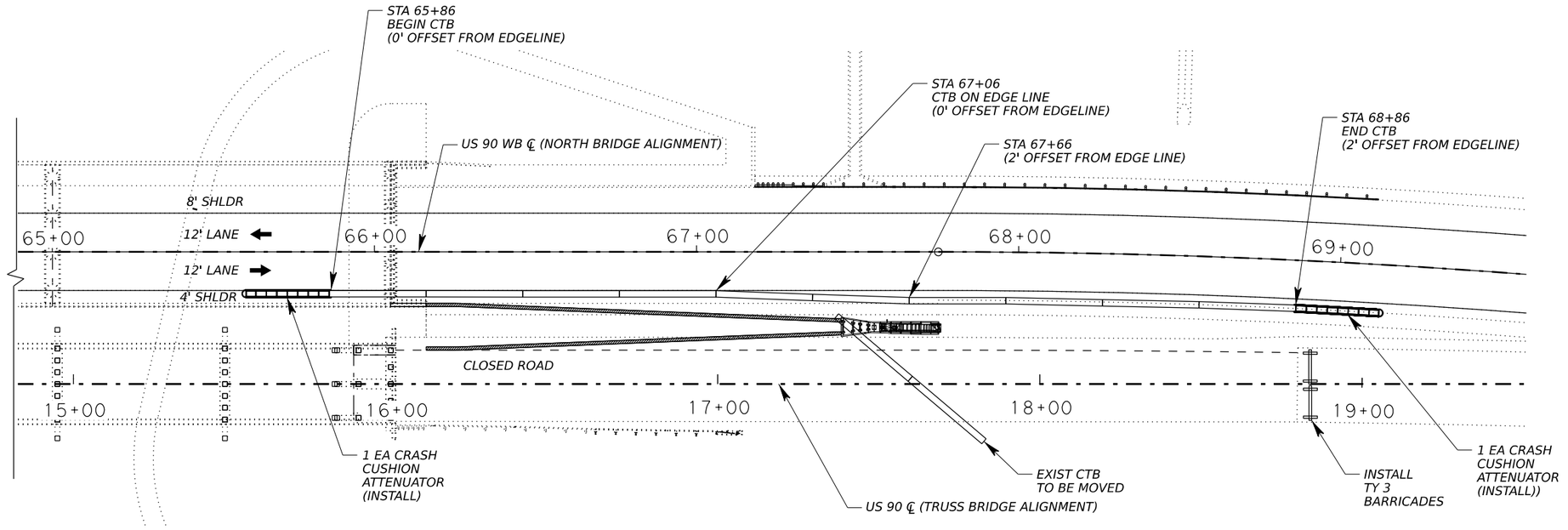
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		
	YKM	COLORADO		
	FEDERAL AID PROJECT			SHEET NO.
				18





NOTES:

NOTES:

1. THE "CTB SUMMARY" FOR "FURNISH & INSTALL", "MOVE", AND "REMOVE" QUANTITY OF PORTABLE CONCRETE TRAFFIC BARRIER IS BASED ON INSTALLING GUARD FENCE AND/OR RAILING ON ONE SIDE OF THE ROADWAY AT THE LOCATION THROUGH COMPLETION.
2. PLACE THE PORTABLE CONCRETE TRAFFIC BARRIER ON THE SHOULDER AT THE OFFSET SHOWN IN THE PLANS UNLESS OTHERWISE DIRECTED.
3. IF THE CONTRACTOR ELECTS TO DEVIATE FROM THE ABOVE SEQUENCE, IT WILL BE AT THE EXPENSE OF THE CONTRACTOR.
4. EXIST US 90 TRUSS BRIDGE FROM STA 8+33.50 TO STA 15+99.00.
   EXIST US 90 WB BRIDGE FROM STA 58+40.07 TO STA 66+05.07.

PATH: T:\YKMANNEX\PS&E\002701042_US90\Plan_Sheets\
FILE: US 90 CTB LAYOUT.dgn
DATE: 3/28/2024

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

03/26/2024

US 90
CTB LAYOUT

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	19

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation

Traffic Safety Division Standard

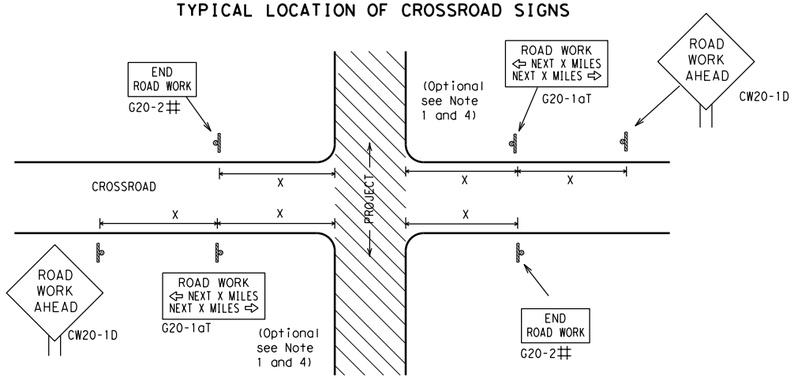
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0027	01	042	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	YKM	COLORADO		20

DATE: 3/13/2024 $TIME$
FILE: $FILE$

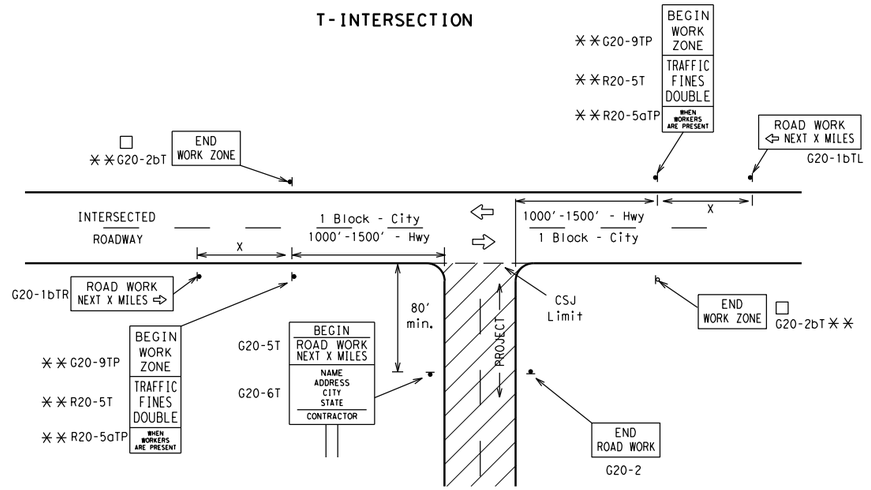
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
✳	✳[3]

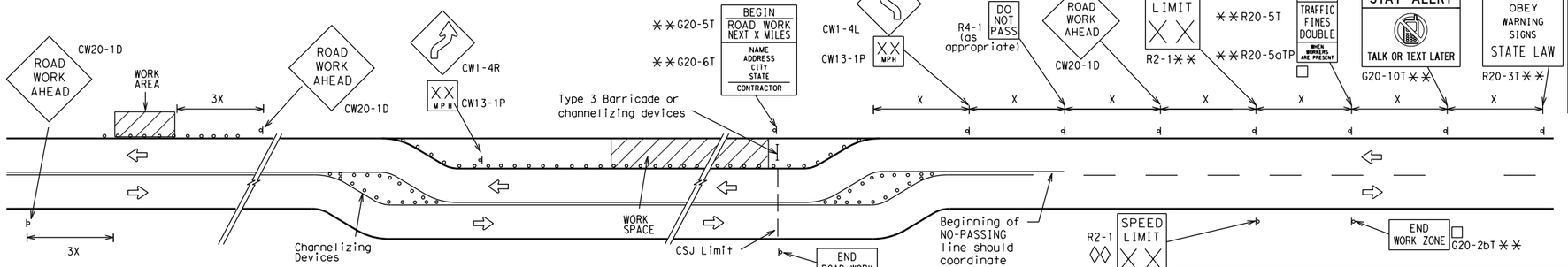
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

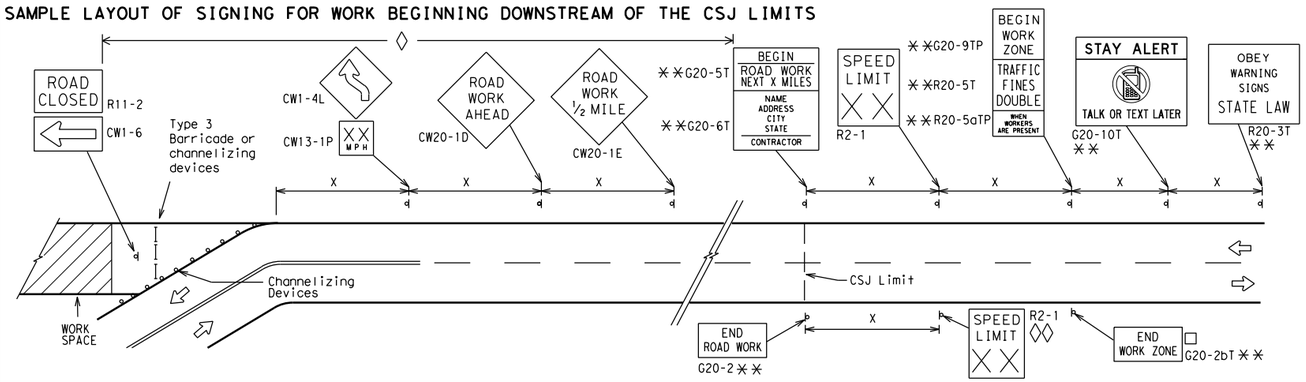
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✳✳ CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◇ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◇◇ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	COLORADO		21

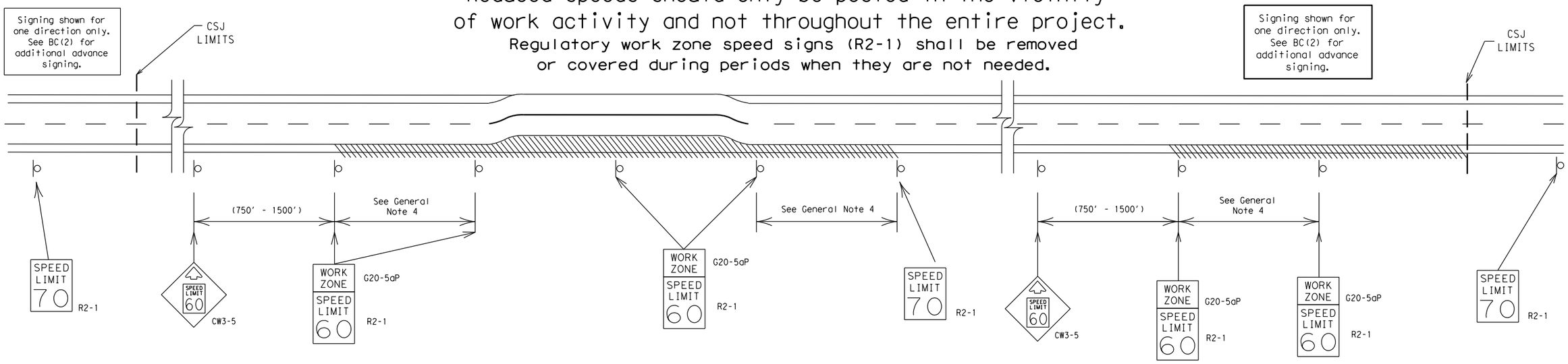
DATE: 3/13/2024 $TIME$
FILE: $FILE$

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

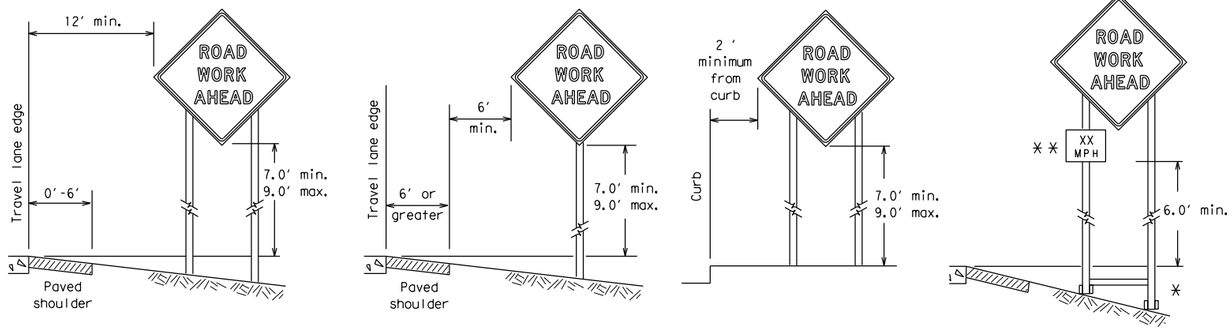
BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		22

97

DATE: 3/13/2024 $TIME$
FILE: $FILE$

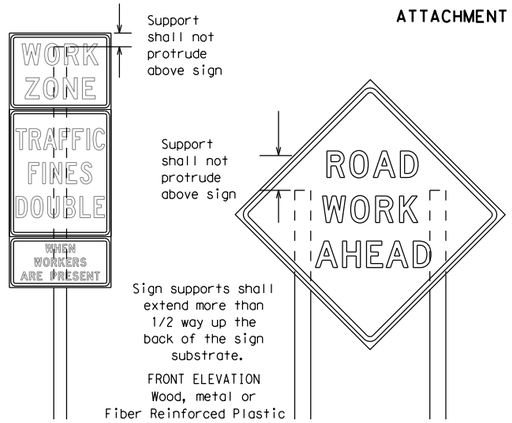
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

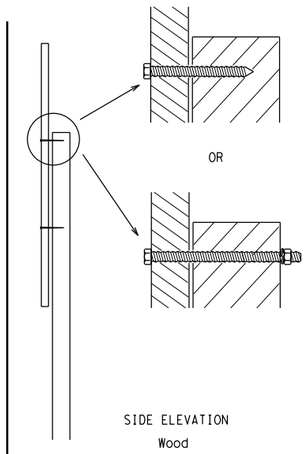


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS





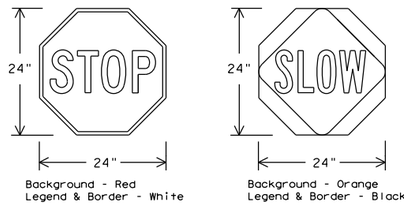
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6′ to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets.The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height,the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

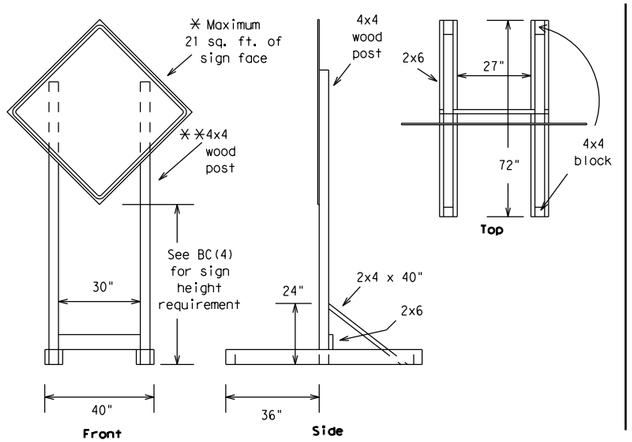
BC(4)-21

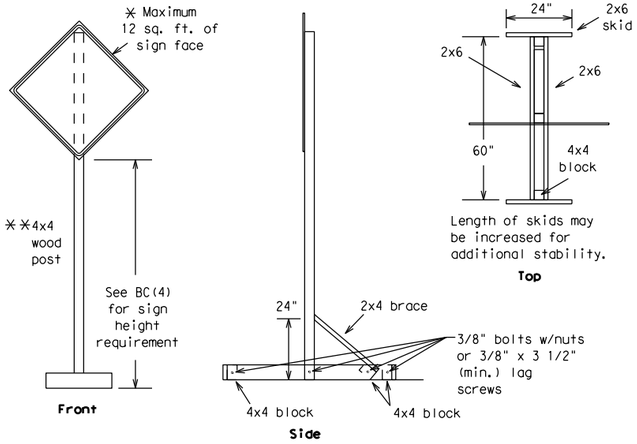
FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0027	01	042	US 90
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		YKM	COLORADO		23

DATE: 3/13/2024 $TIME$
FILE: $FILE$

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

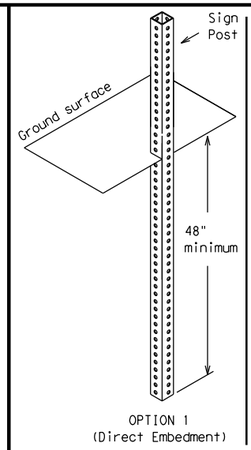
DATE: 3/13/2024 $TIME$
FILE: $FILE$

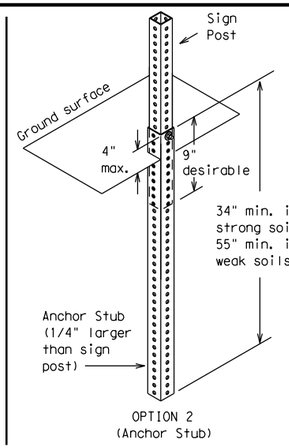


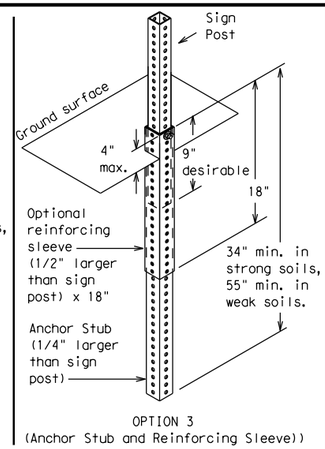


SKID MOUNTED WOOD SIGN SUPPORTS

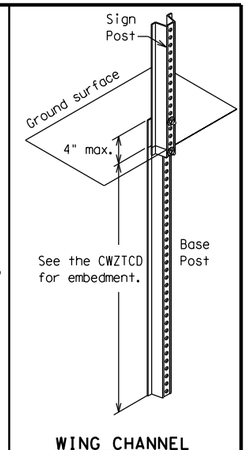
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







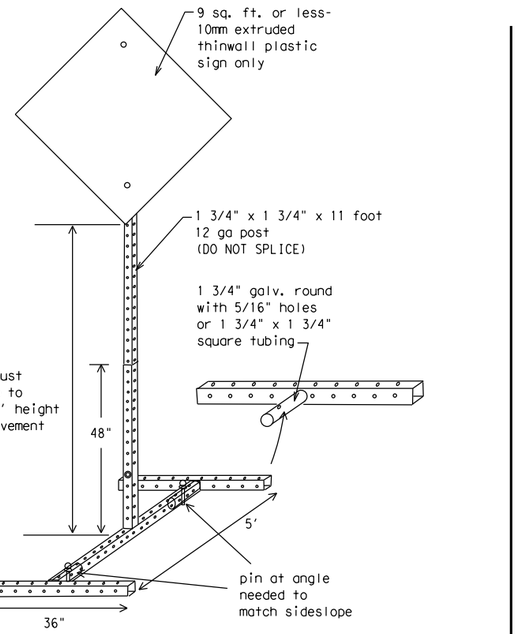
PERFORATED SQUARE METAL TUBING

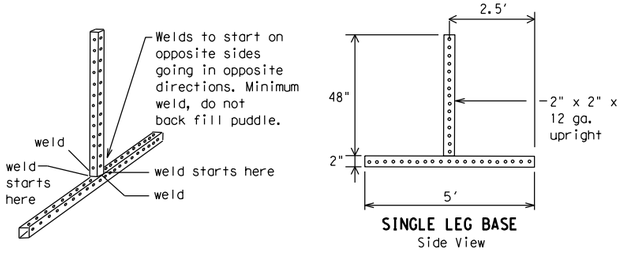


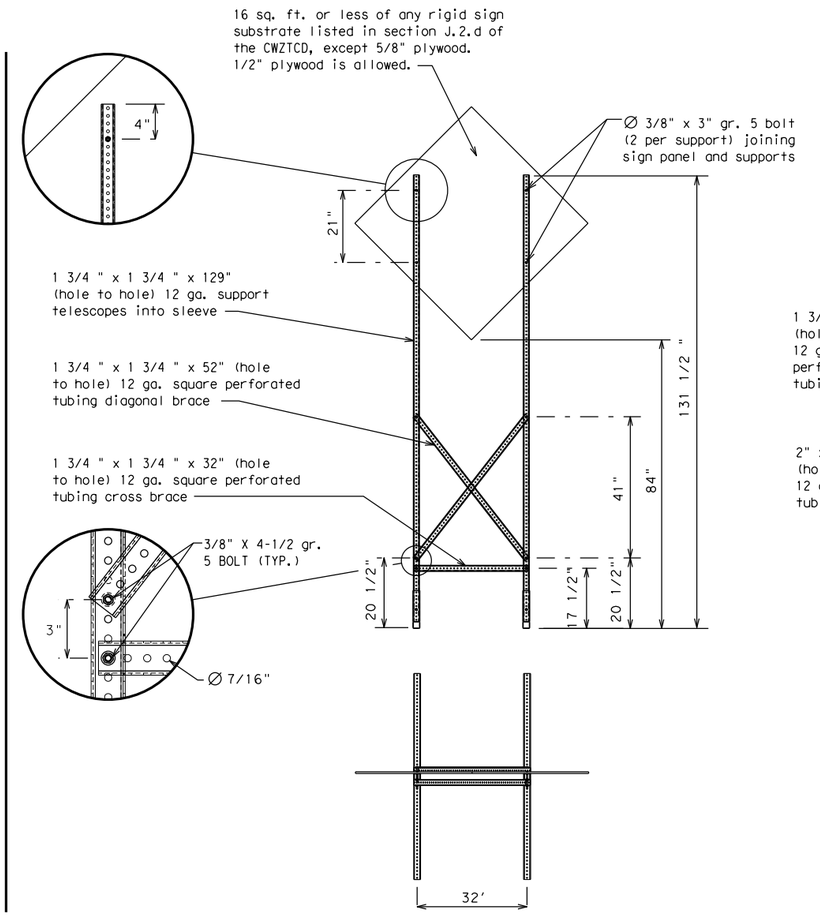
WING CHANNEL
Lap-splice/base bolted anchor

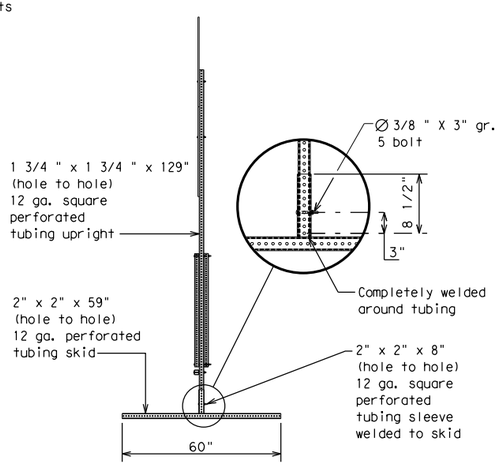
GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

□ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	COLORADO		24

WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

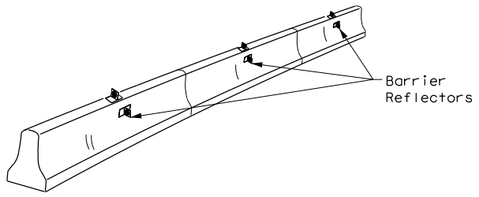
FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0027	01	042	US 90
9-07	8-14	DIST	COUNTY		SHEET NO.
7-13	5-21	YKM	COLORADO		25

100

DATE: 3/13/2024 $TIME$
FILE: $FILE$

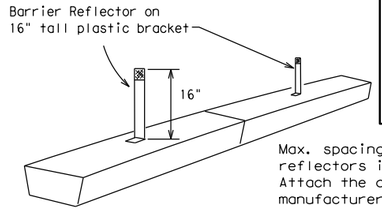
DATE: 3/13/2024 $TIME$
FILE: $FILE$

1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



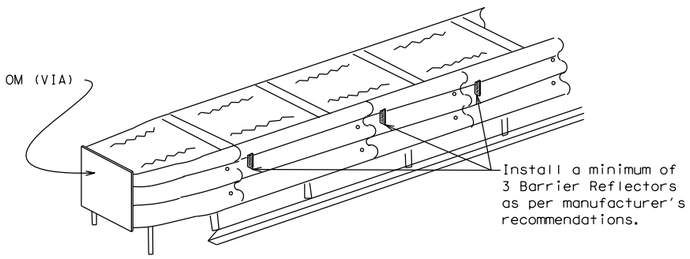
CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

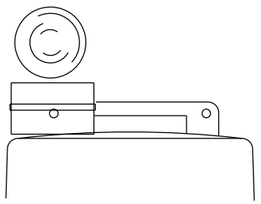
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

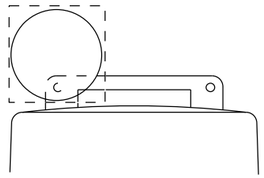
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

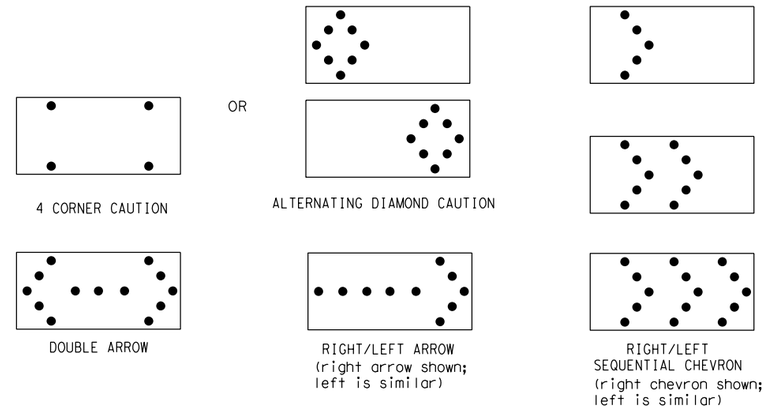
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	COLORADO		26

101

DATE: 3/13/2024 $TIME$
FILE: $FILE$

GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

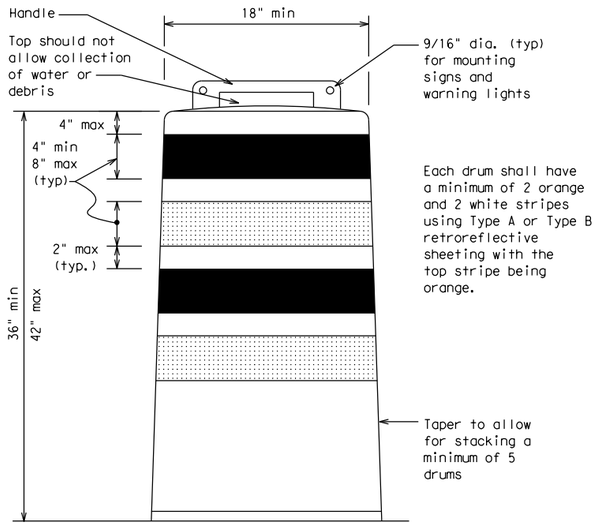
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

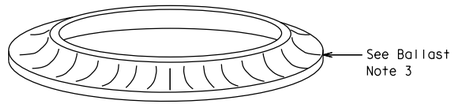
RETROREFLECTIVE SHEETING

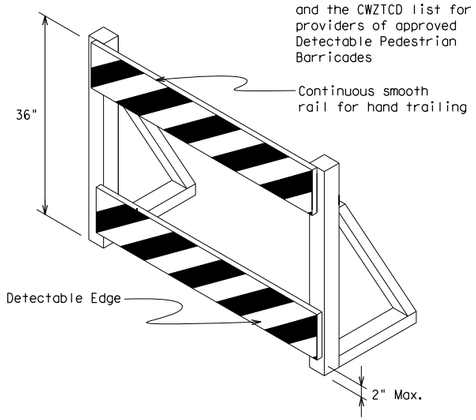
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

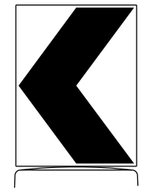




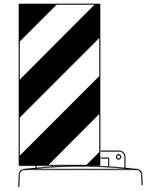


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

.

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

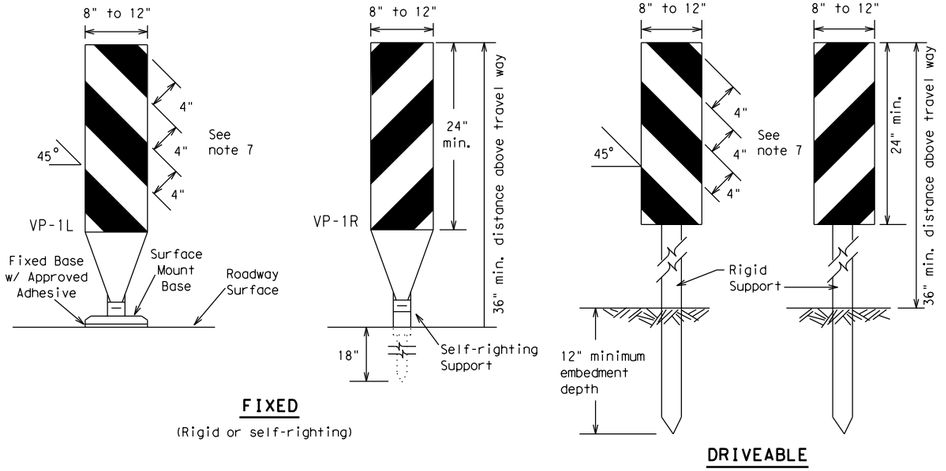
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

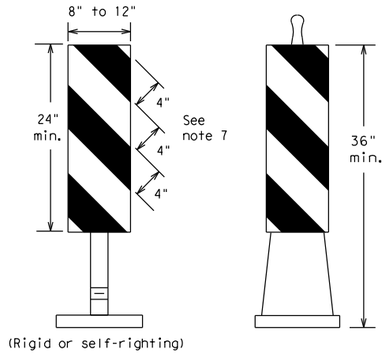
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	YKM	COLORADO		27
7-13				

102



FIXED
(Rigid or self-righting)

DRIVEABLE

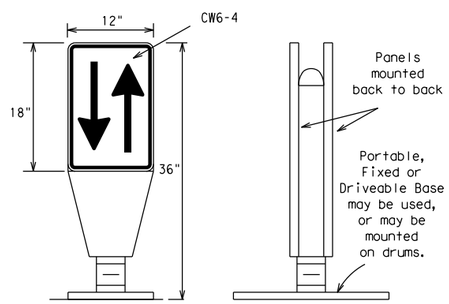


(Rigid or self-righting)

PORTABLE

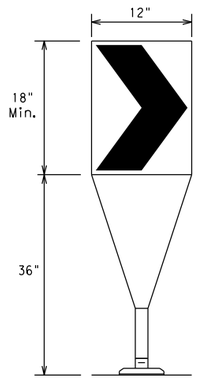
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



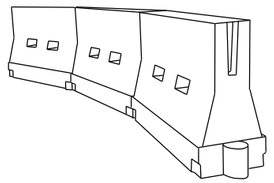
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

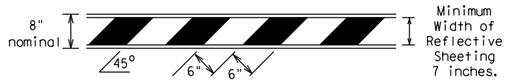
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	COLORADO		28

DATE: 3/13/2024 $TIME$
FILE: $FILE$

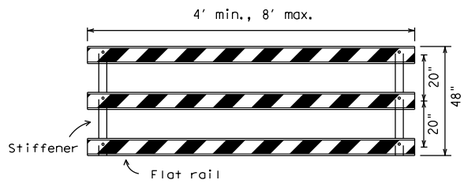
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



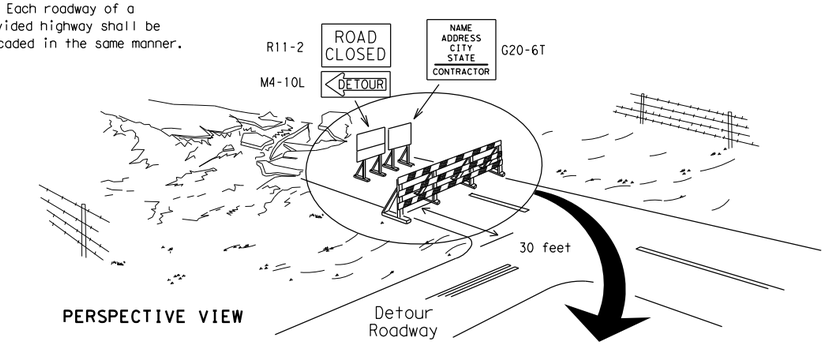
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

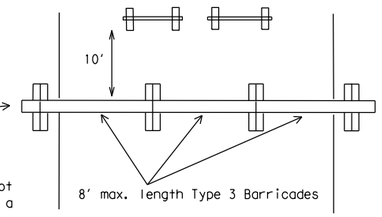
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

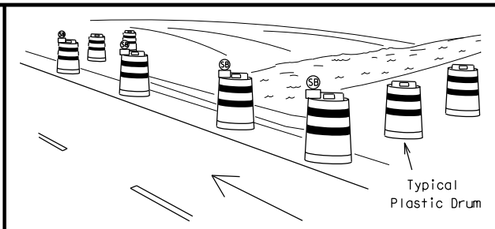
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

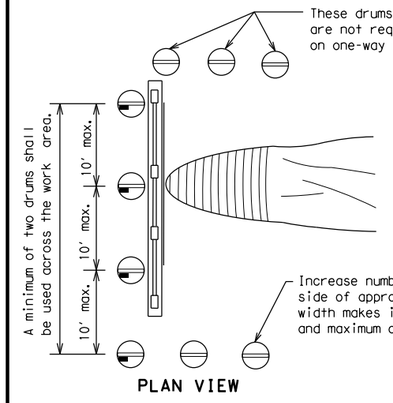
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

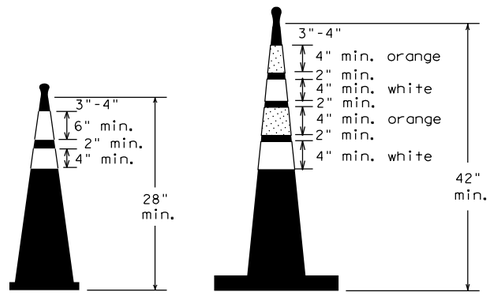
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



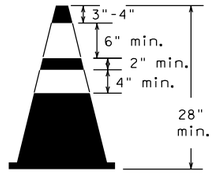
PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

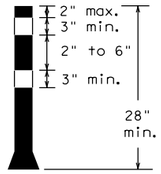
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

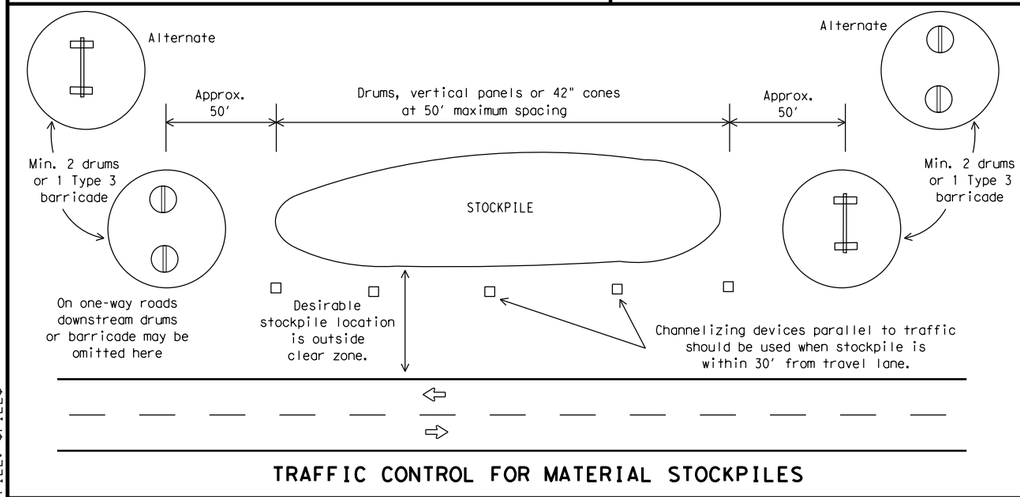


Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	COLORADO		29

104

DATE: 3/13/2024 $TIME$
FILE: $FILE$

WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

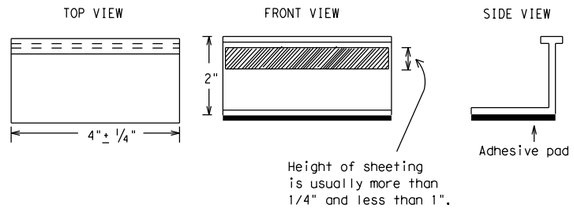
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

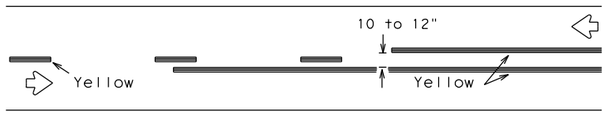
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		30

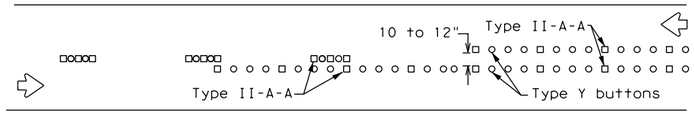
105

DATE: 3/13/2024 $TIME$
FILE: $FILE$

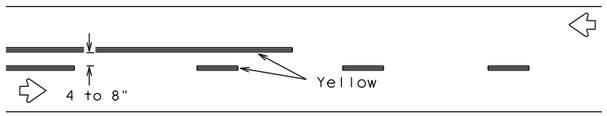
PAVEMENT MARKING PATTERNS



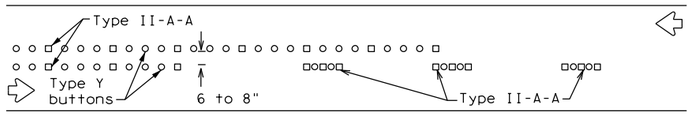
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



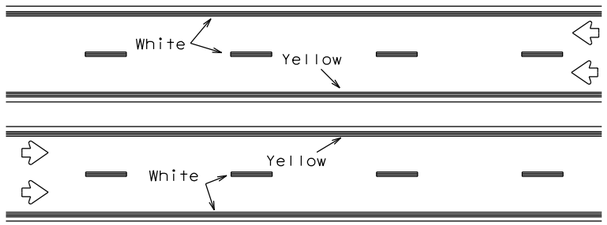
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



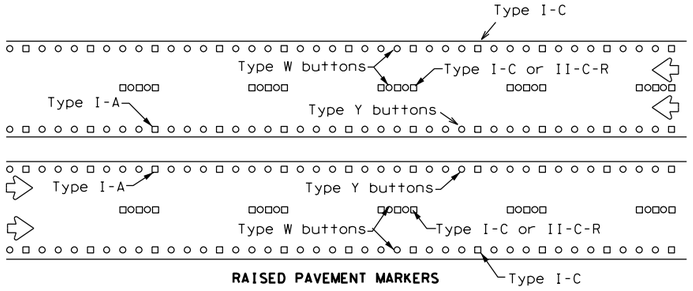
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



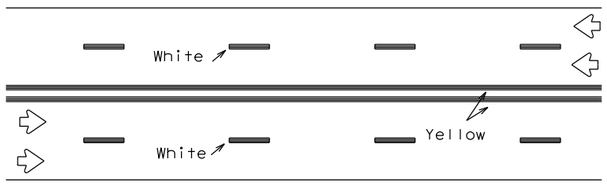
REFLECTORIZED PAVEMENT MARKINGS



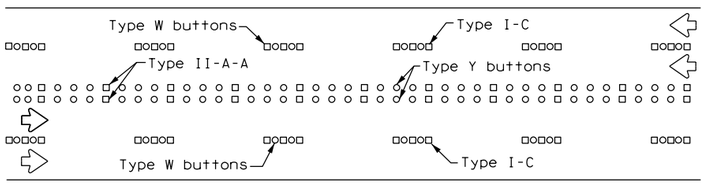
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



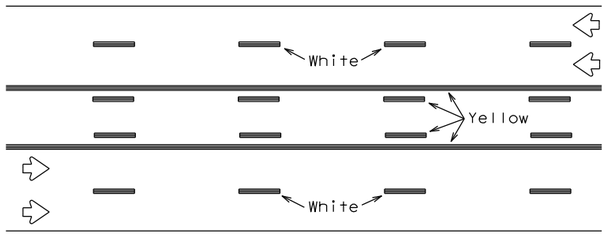
REFLECTORIZED PAVEMENT MARKINGS



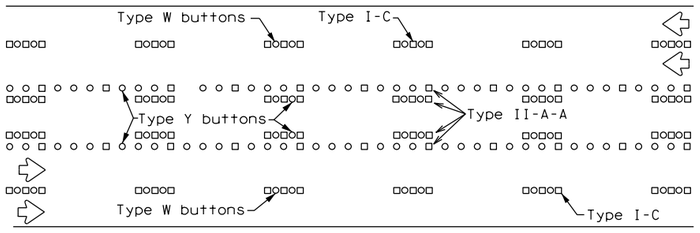
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

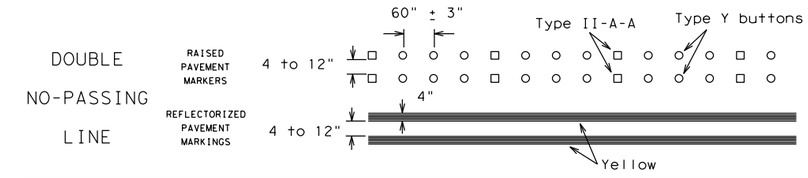
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

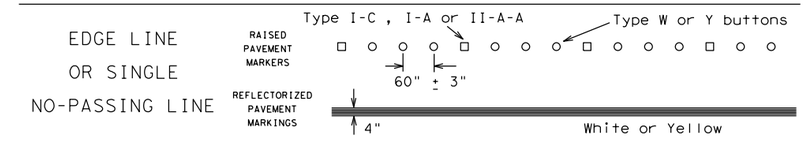
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

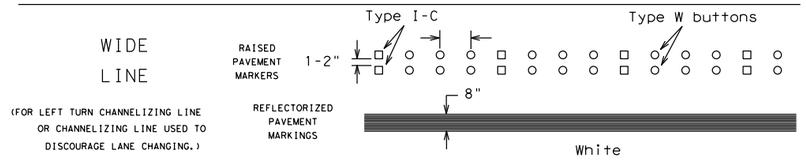


EDGE LINE OR SINGLE NO-PASSING LINE



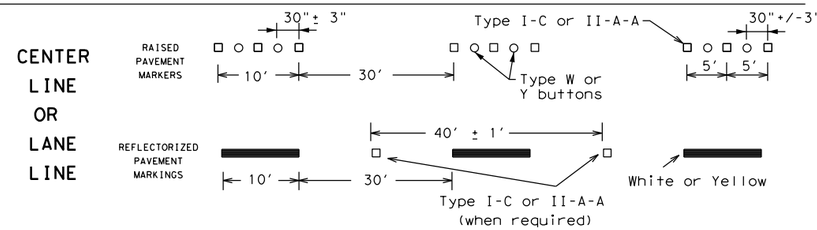
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

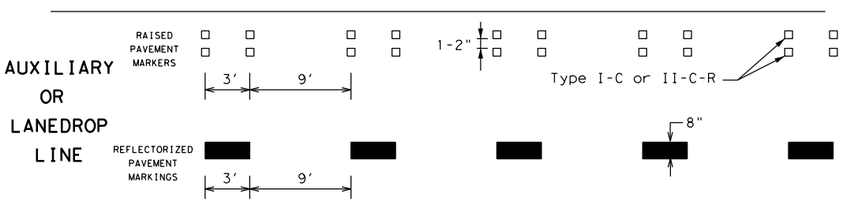


BROKEN LINES

CENTER LINE OR LANE LINE

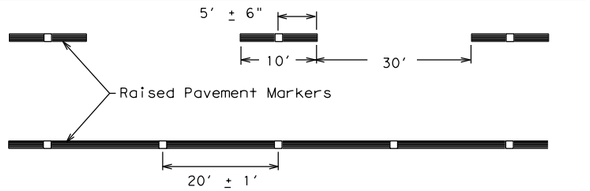


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

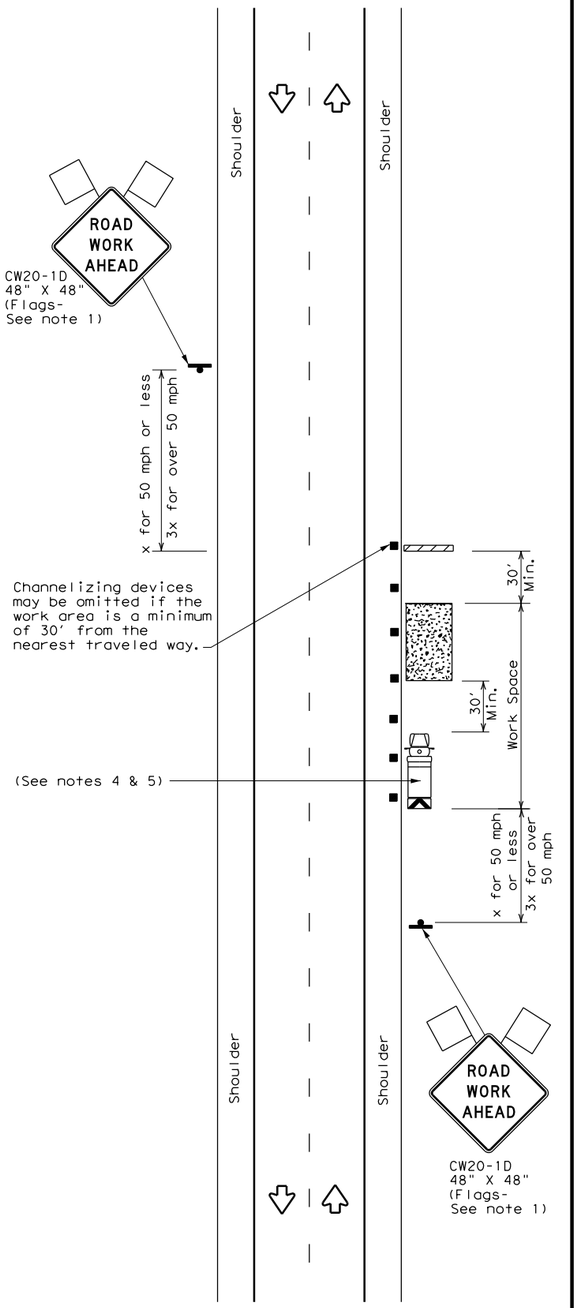
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		31

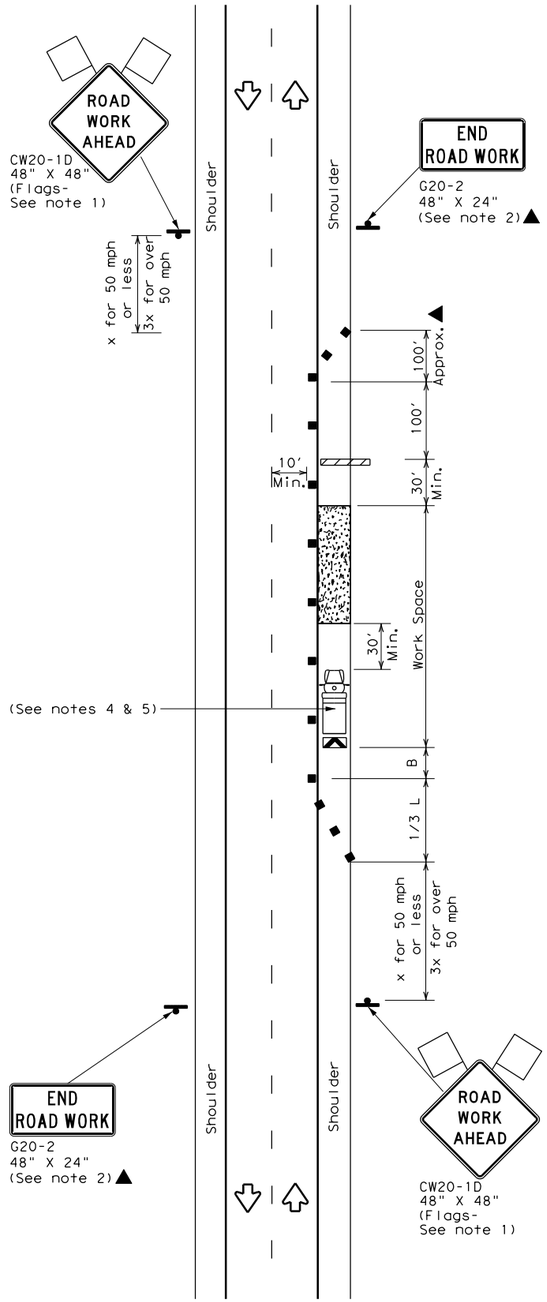
106

DATE: 3/13/2024 $TIME$
FILE: $FILE$



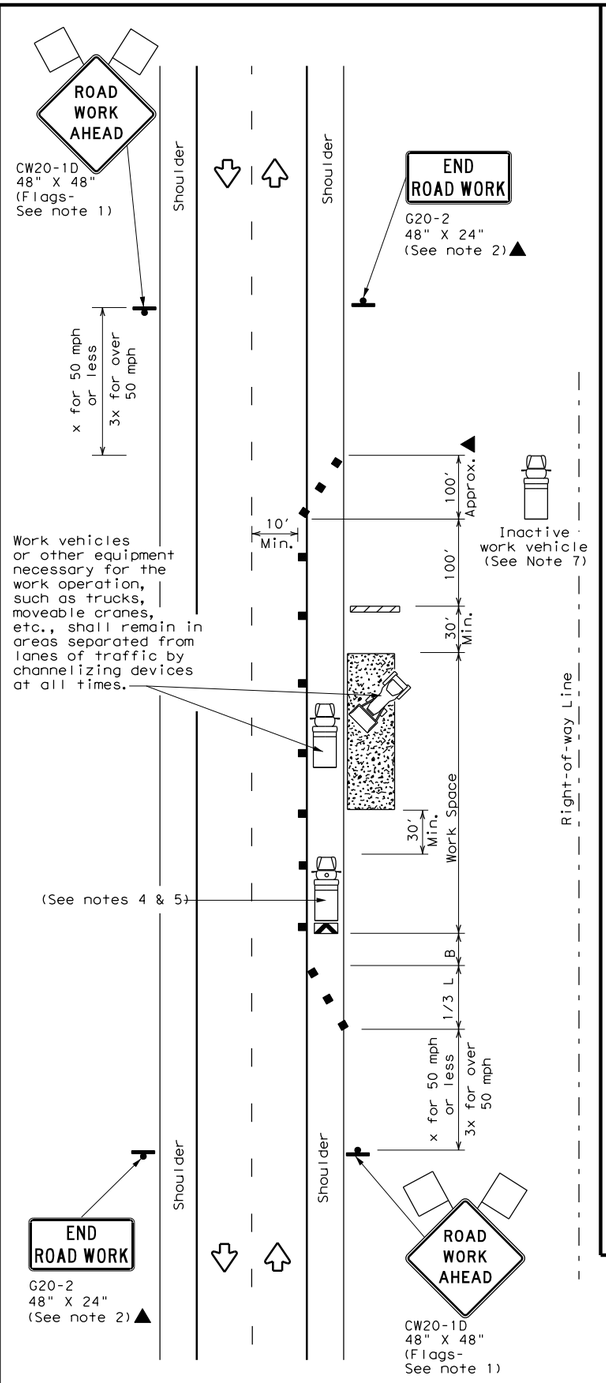
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

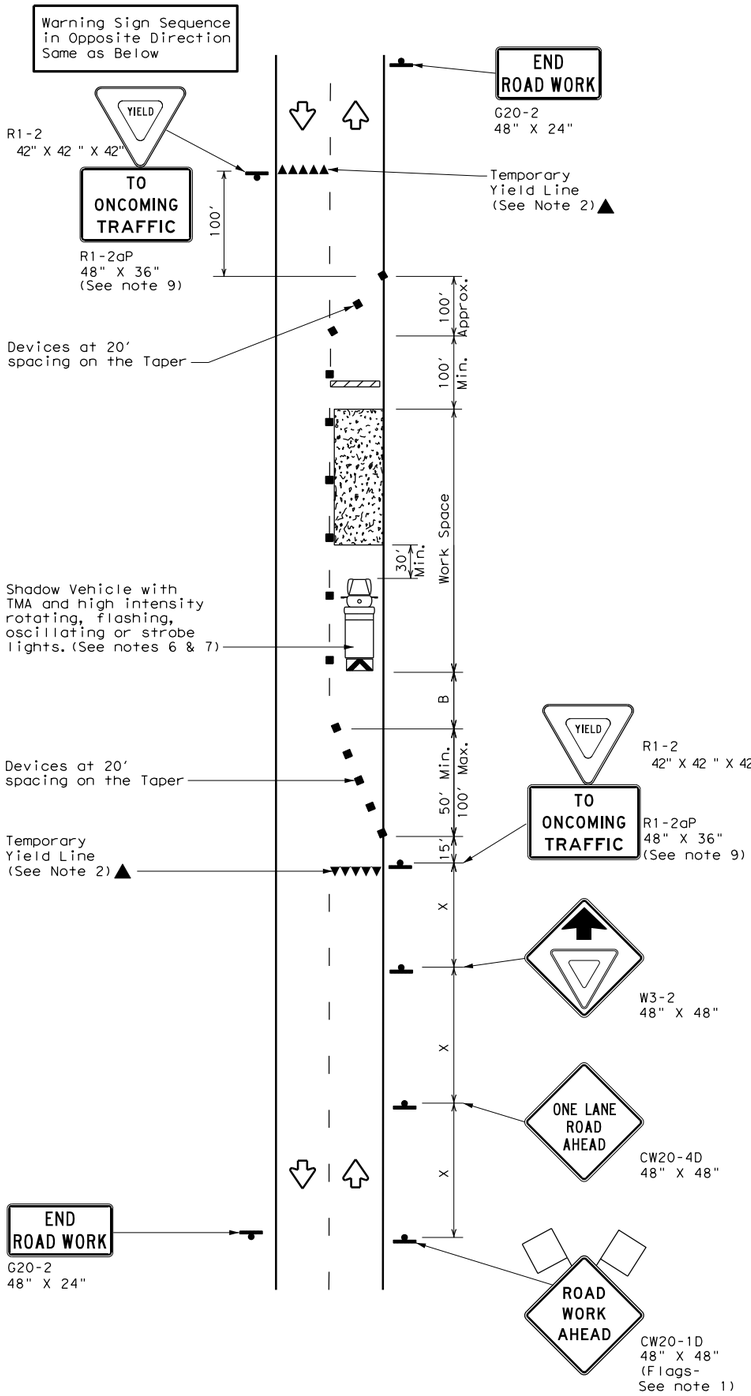
TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

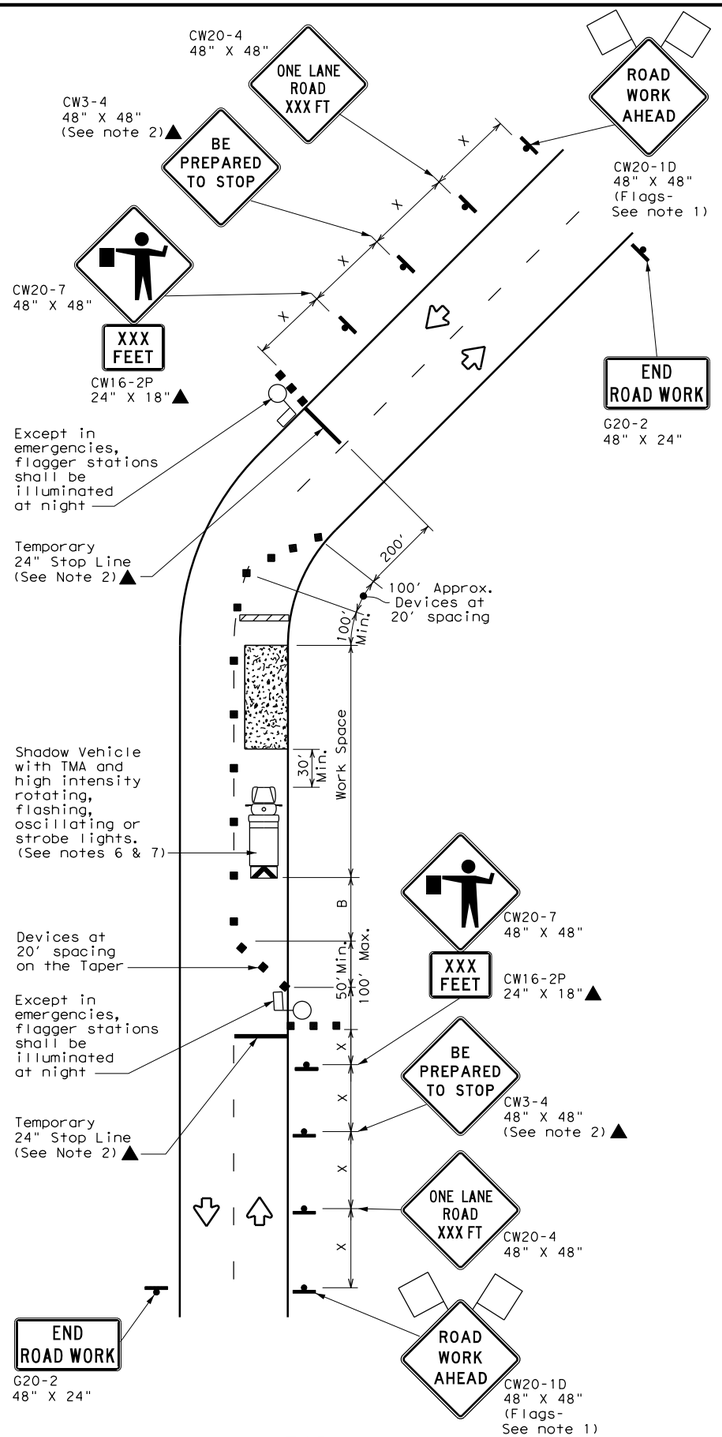
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	YKM	COLORADO		32
1-97 2-18				

161

DATE: 3/13/2024 $TIME$
FILE: $FILE$



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

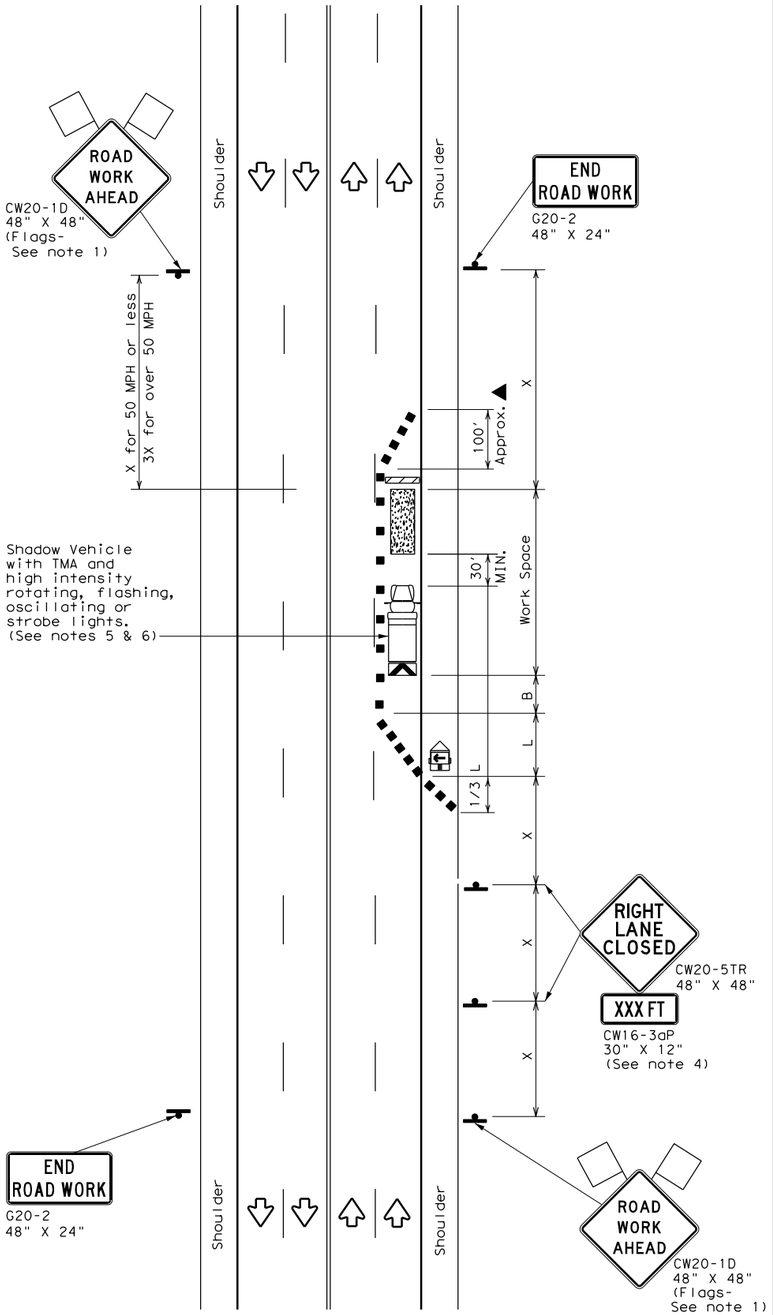
TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		33

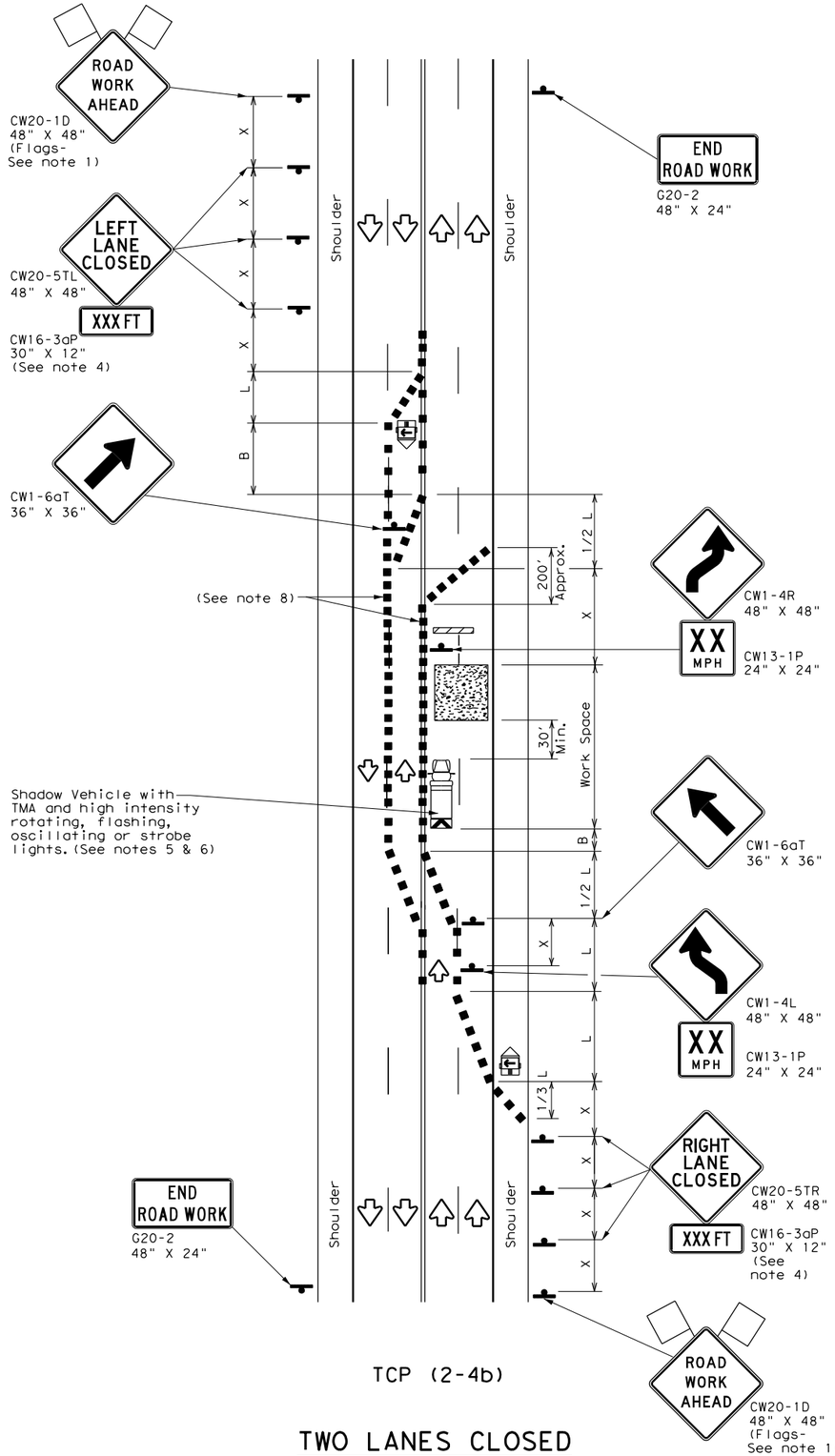
DATE: 3/13/2024 $TIME$
FILE: $FILE$

DATE: 3/13/2024 $TIME$
FILE: $FILE$



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

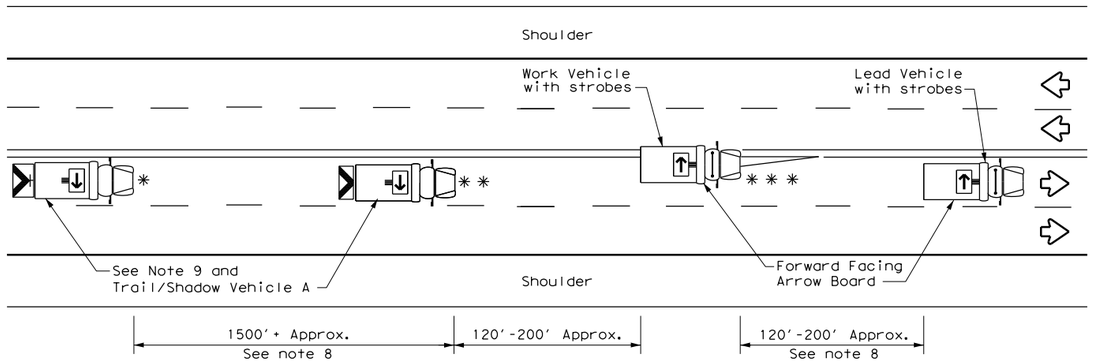
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

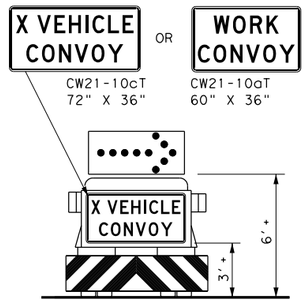
TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	YKM	COLORADO		34
4-98 2-18				



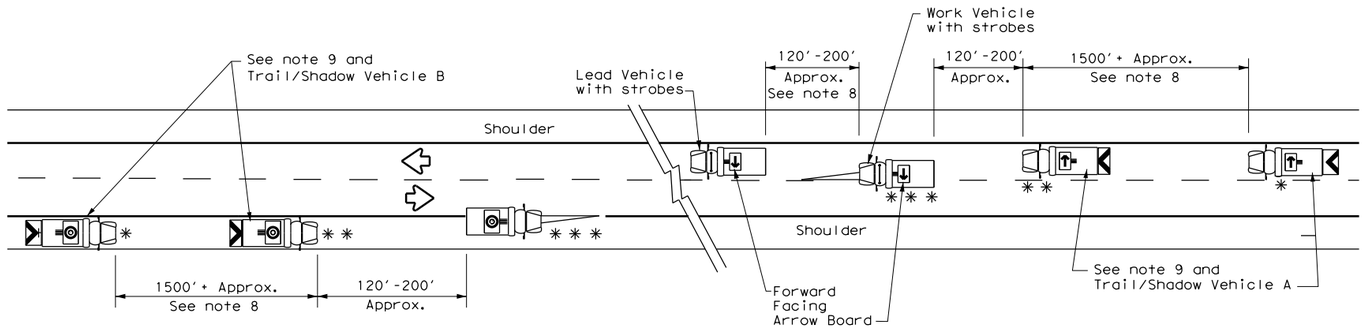
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

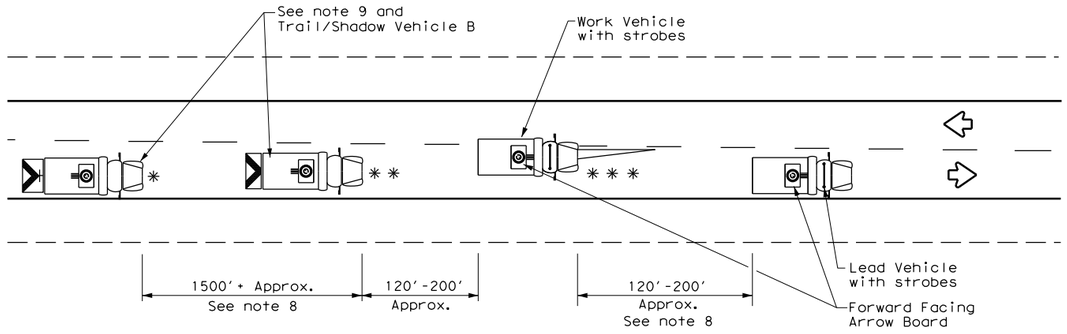


WORK ON SHOULDER

WORK ON TRAVEL LANE

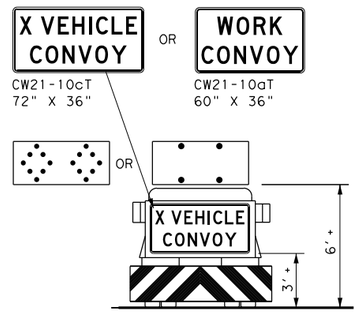
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

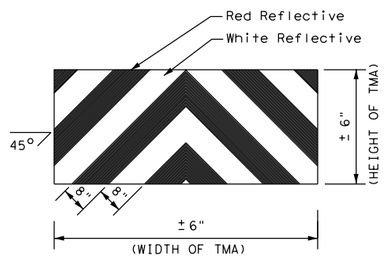
with Flashing Arrow Board in CAUTION display

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
* *	Shadow Vehicle		
* * *	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

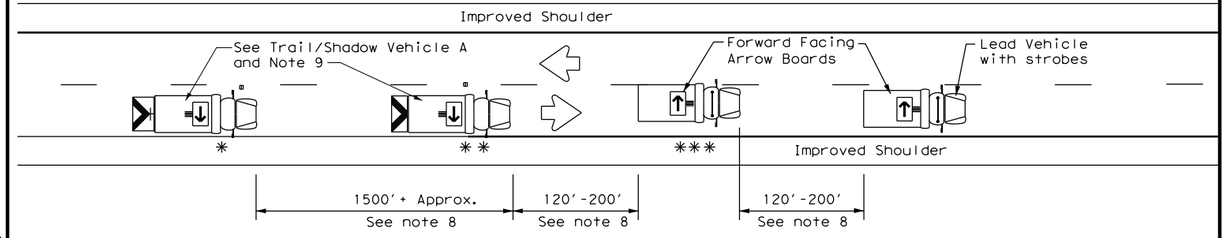
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

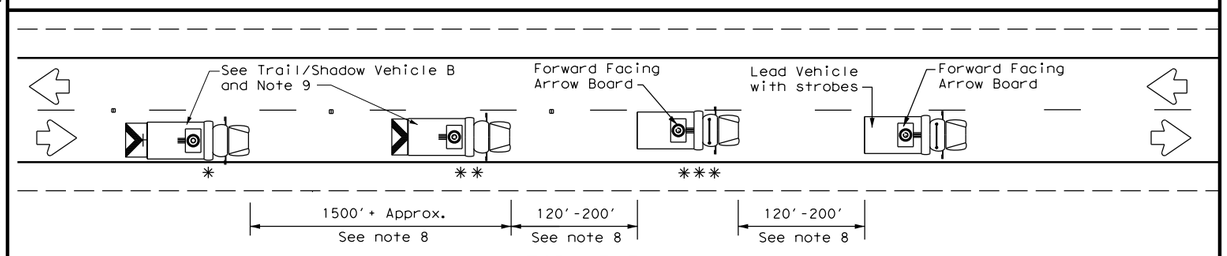
FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		35

DATE: 3/13/2024 $TIME$
FILE: $FILE$



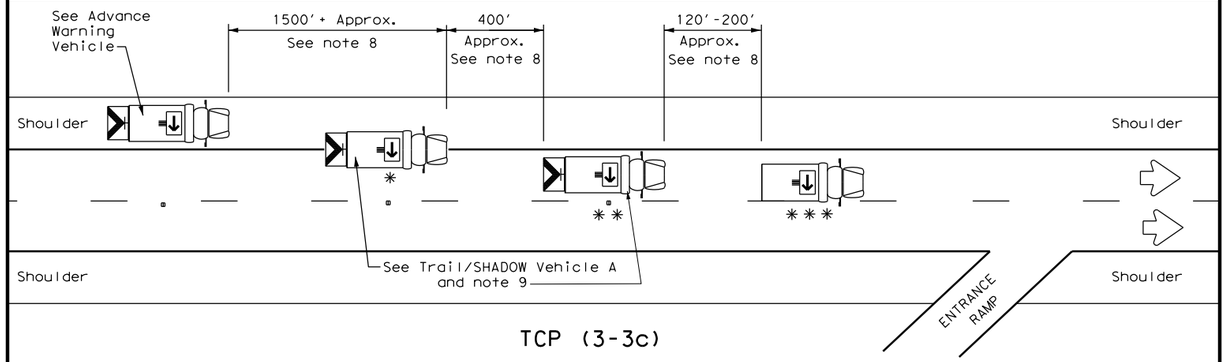
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



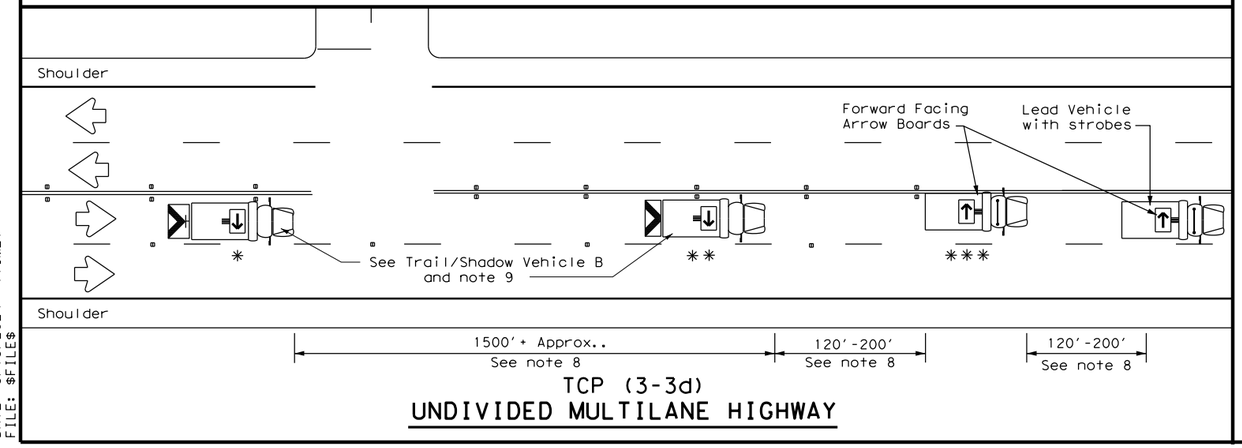
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



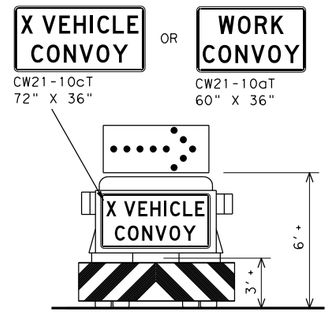
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



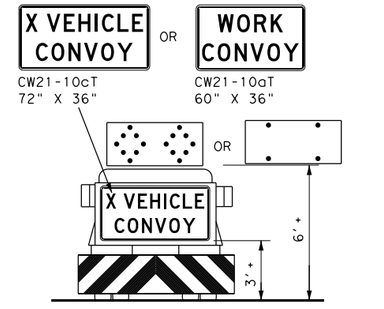
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



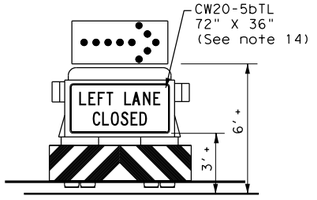
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

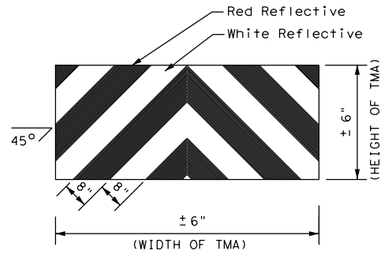


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

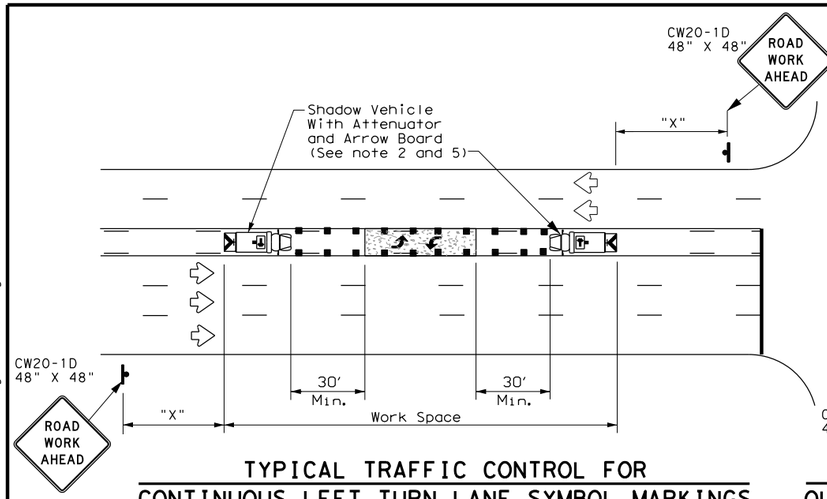
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

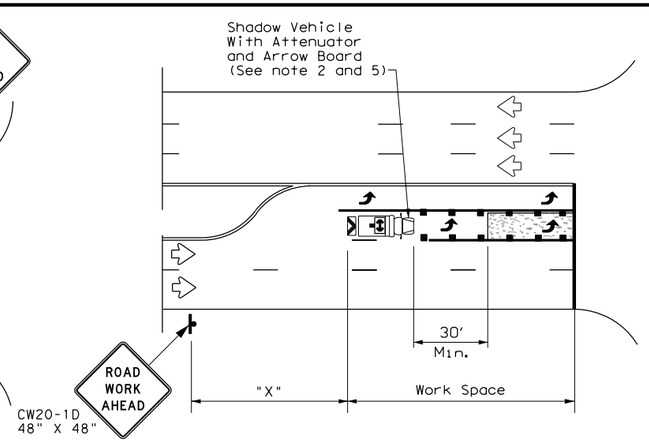
TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	YKM	COLORADO		36
1-97 7-14				

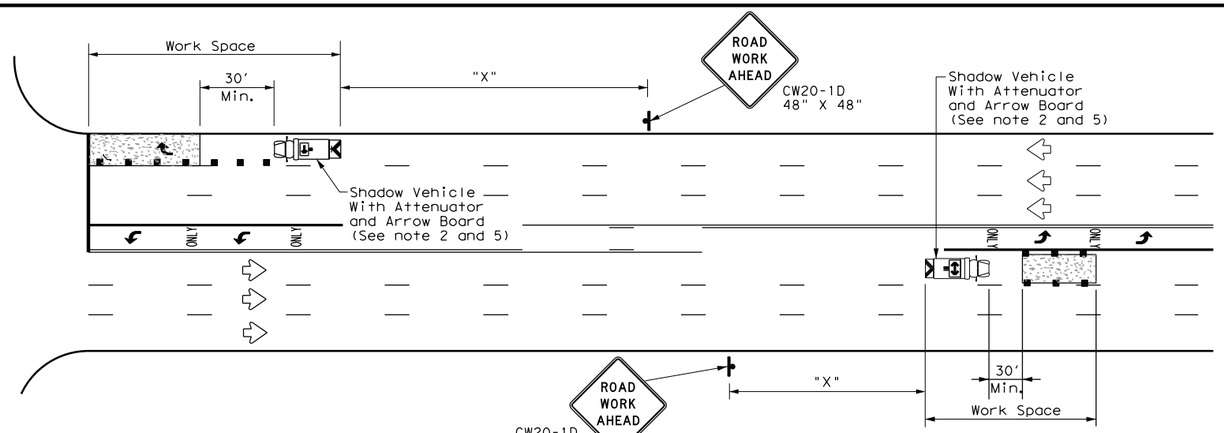
DATE: 3/13/2024 $TIME$
FILE: $FILE$



TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

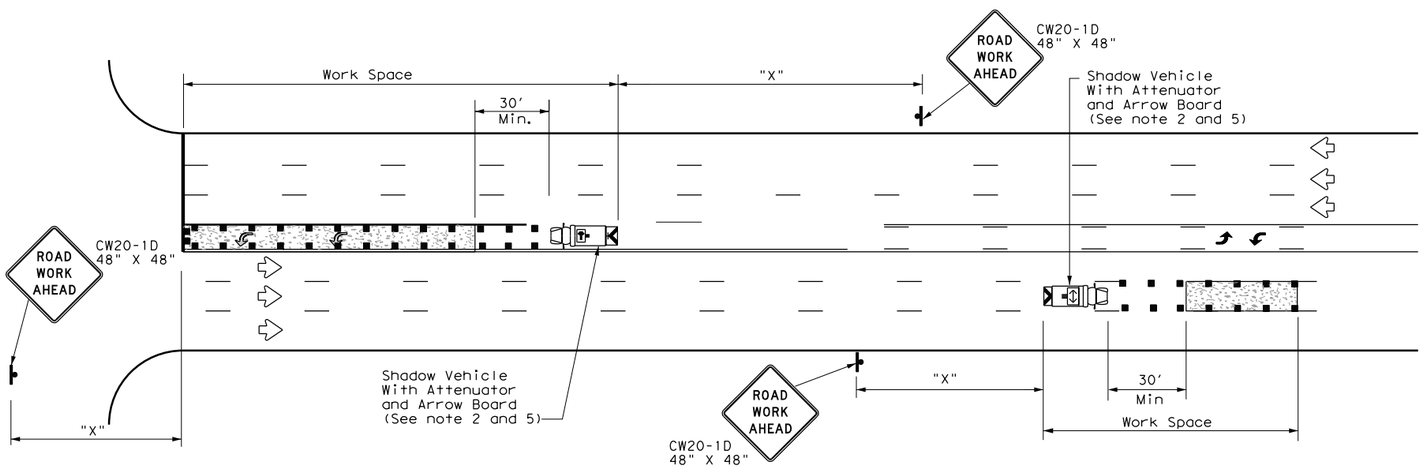


TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR
OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
CENTER LANE MARKINGS

LEGEND			
✳	Trail Vehicle	ARROW BOARD DISPLAY	
✳✳	Shadow Vehicle		
✳✳✳	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow	■ ■ ■	Channelizing Devices

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

✳ Conventional Roads Only

✳✳ Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

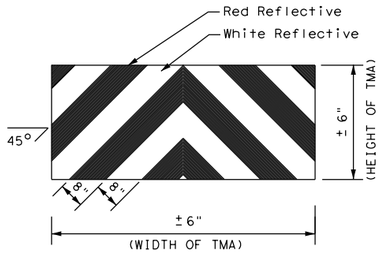
1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.

2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.

3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.

4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

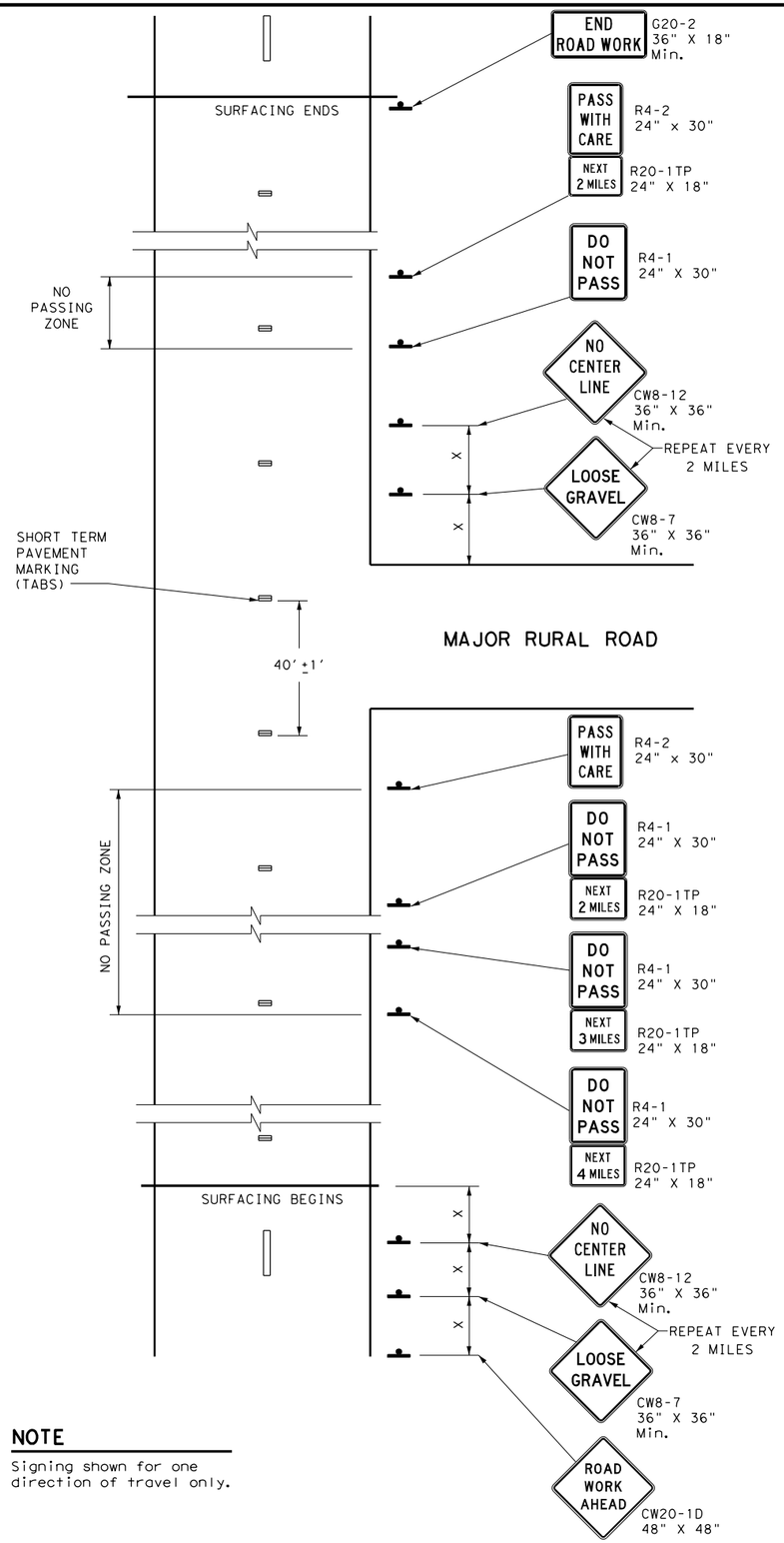
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		37

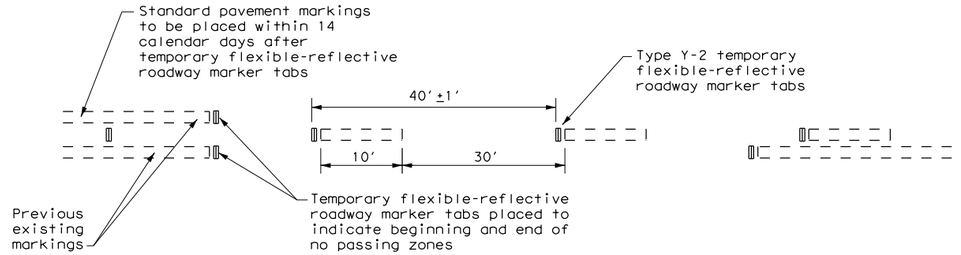
DATE: 3/13/2024 $TIME$
FILE: $FILE$



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120′
35	160′
40	240′
45	320′
50	400′
55	500′
60	600′
65	700′
70	800′
75	900′

* Conventional Roads Only

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Operations Division Standard

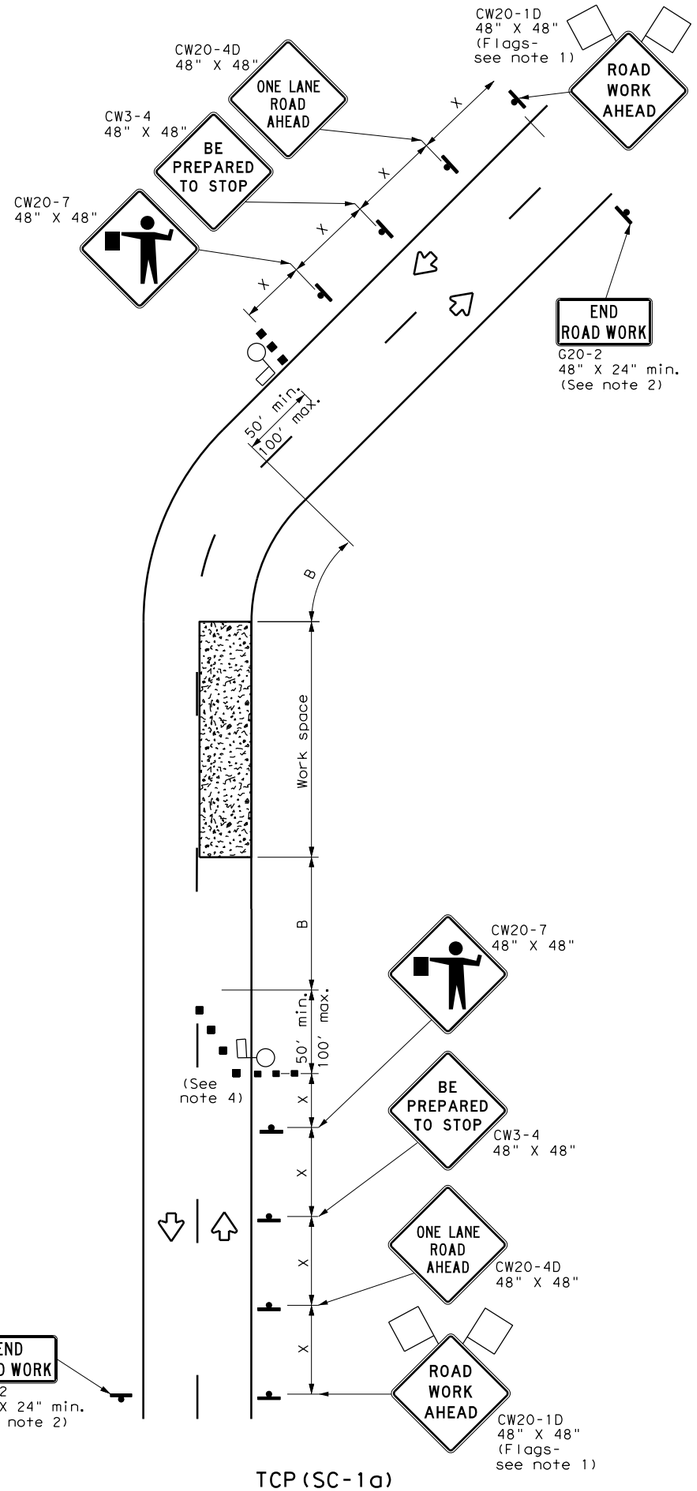
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE:	tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS		0027	01	042	US 90
4-92 4-98		DIST	COUNTY		SHEET NO.
1-97 7-13		YKM	COLORADO		38

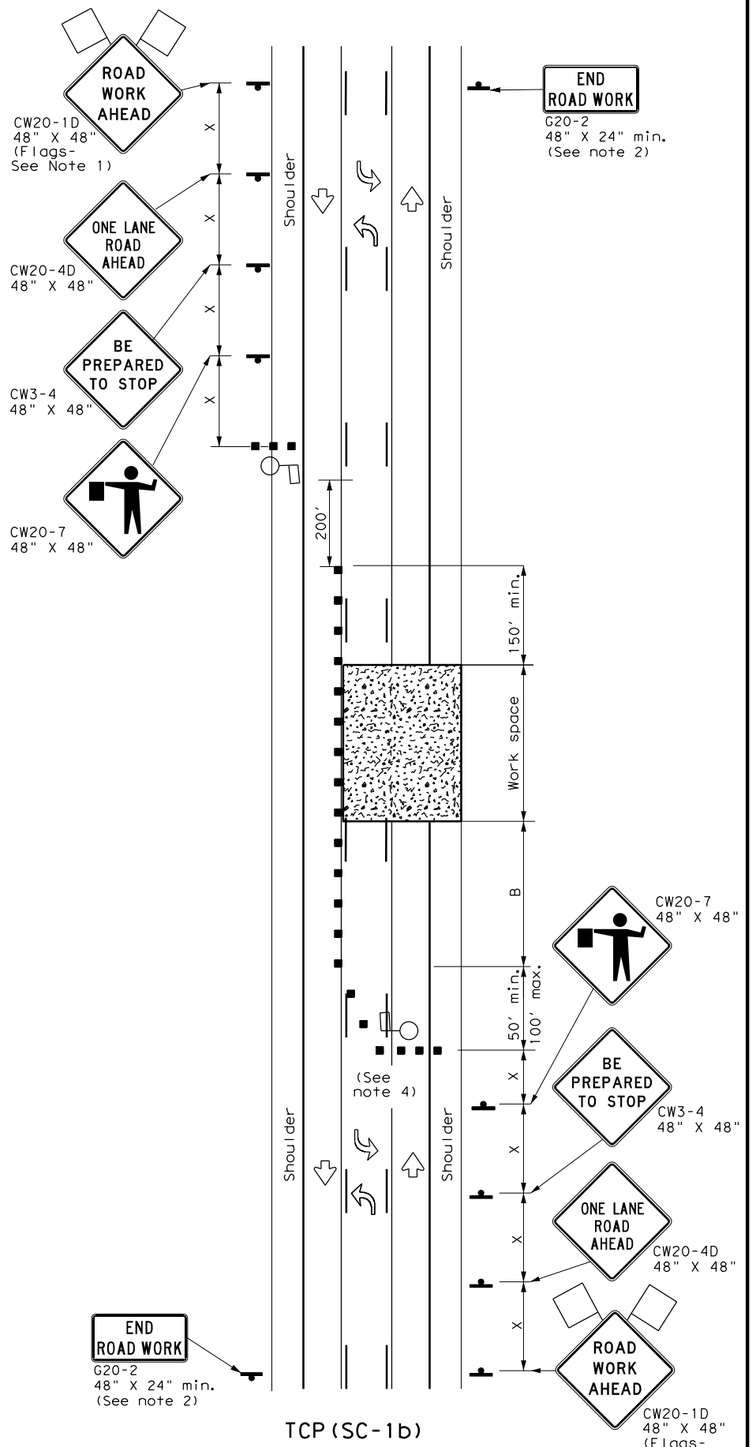
210

DATE: 3/13/2024 $TIME$
FILE: $FILE$



TCP(SC-1a)

ONE LANE TWO-WAY (TWO LANES) CONTROL WITH PILOT VEHICLE



TCP(SC-1b)

ONE LANE TWO-WAY (THREE LANES) CONTROL WITH PILOT VEHICLE AND CHANNELIZING DEVICES

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L = Length of Taper (FT) W = Width of Offset (FT) S = Posted Speed (MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Sign spacing may be increased or an additional ROAD WORK AHEAD (CW20-1D) sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
4. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
5. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
6. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
7. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
8. Temporary rumble strips are not required on seal coat operations.
9. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

1. Channelizing devices on the centerline are not required when a pilot car is leading traffic, unless directed by the Engineer.

Texas Department of Transportation — Traffic Safety Division Standard

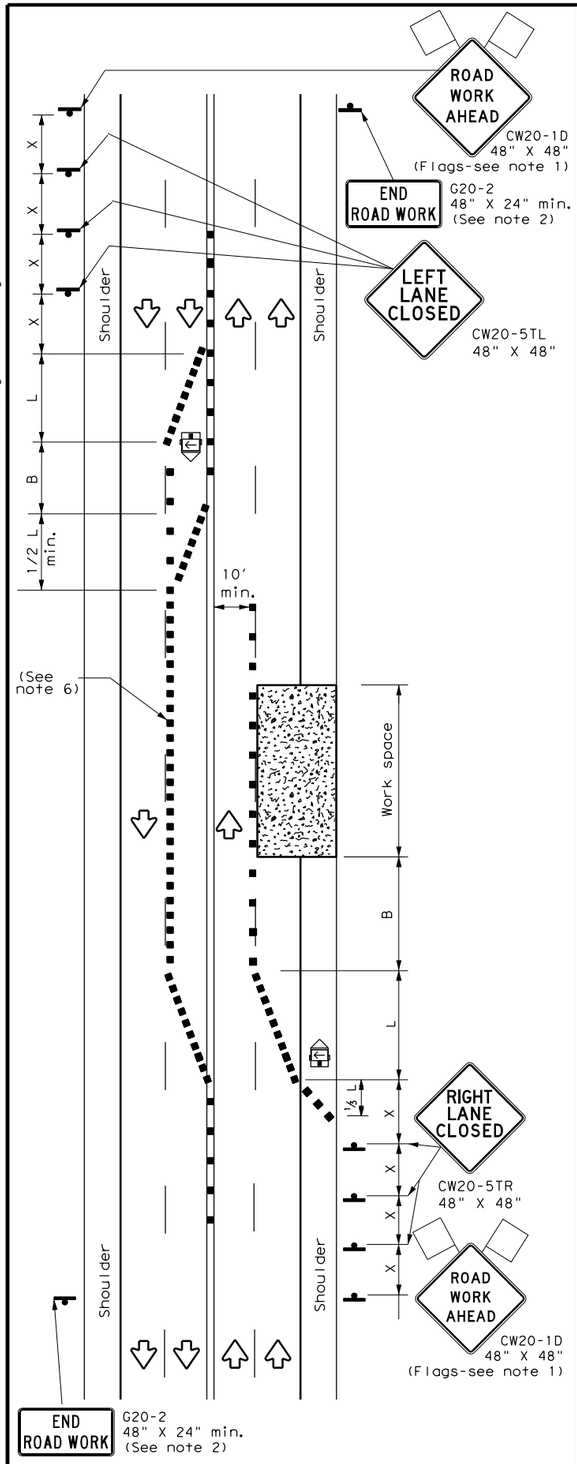
TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS ONE-LANE TWO-WAY

TCP(SC-1)-22

FILE: tcpsc-1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		39

217

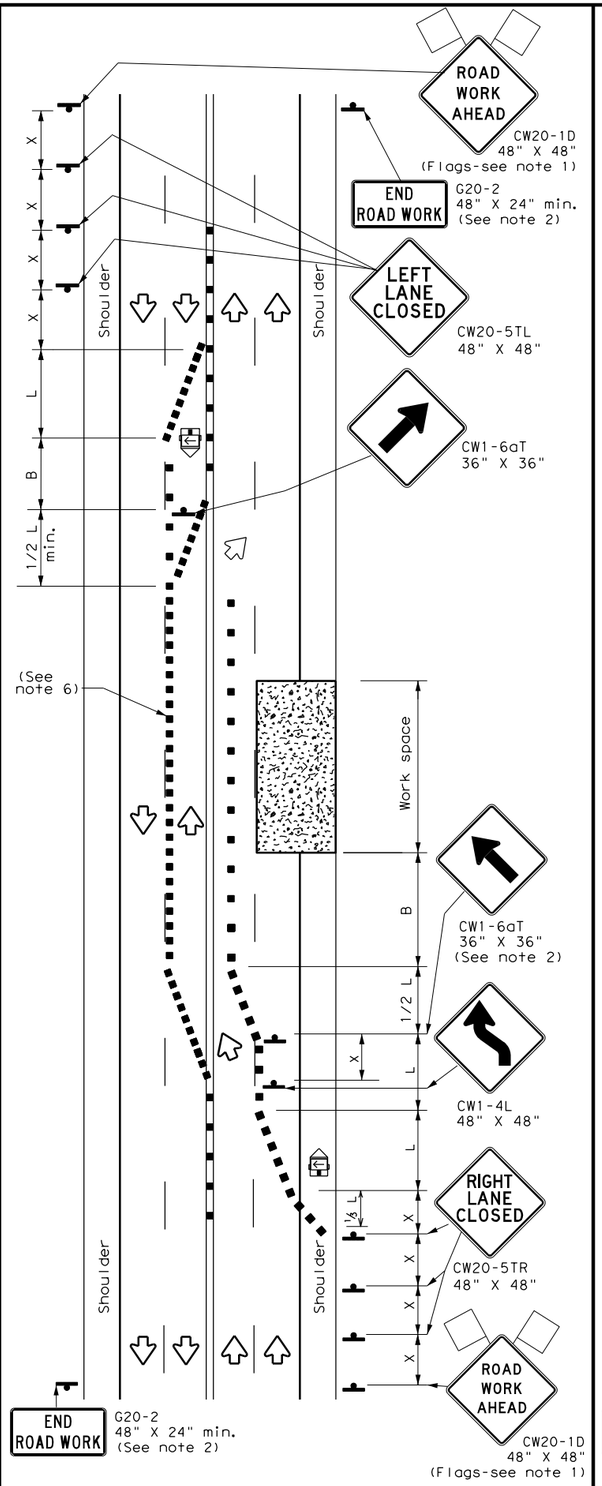
DATE: 3/13/2024 $TIME$
FILE: $FILE$



TCP (SC-2a)

ONE LANE CLOSED EACH DIRECTION

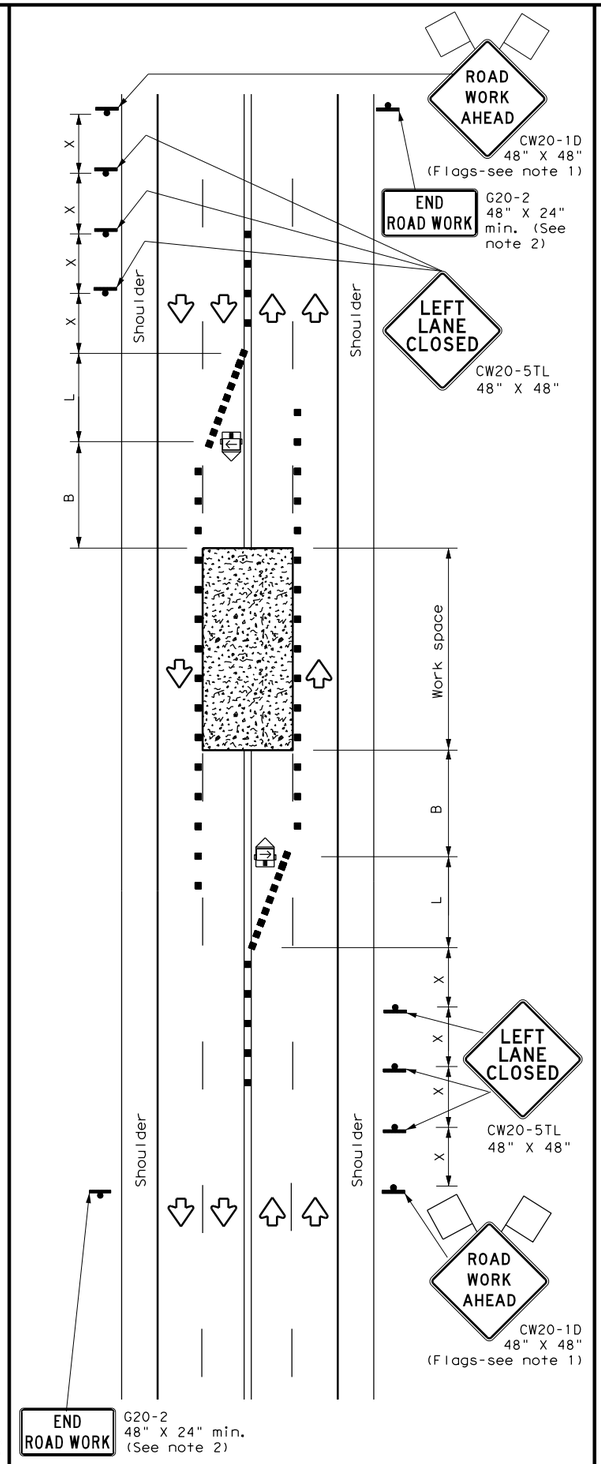
CONTROL W/ CHANNELIZING DEVICES



TCP (SC-2b)

ONE LANE CLOSED EACH DIRECTION

CONTROL W/ CHANNELIZING DEVICES



TCP (SC-2c)

CENTER LANES CLOSED

CONTROL W/ CHANNELIZING DEVICES

DATE: 3/13/2024 $TIME$
FILE: $FILE$

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing Distance "X"	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L = Length of Taper (FT) W = Width of Offset (FT)
S = Posted Speed (MPH)

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. The ROAD WORK AHEAD (CW20-1D) sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
5. Temporary rumble strips are not required on seal coat operations.

TCP (SC-2a) and (SC-2b)

6. Channelizing devices which separate two-way traffic shall be spaced on tapers at:
   a.) 20 feet;
   b.) 15 feet when posted speeds are 35 mph or slower; or
   c.) at 1/2(S) for tangent sections.
   This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Safety Division Standard

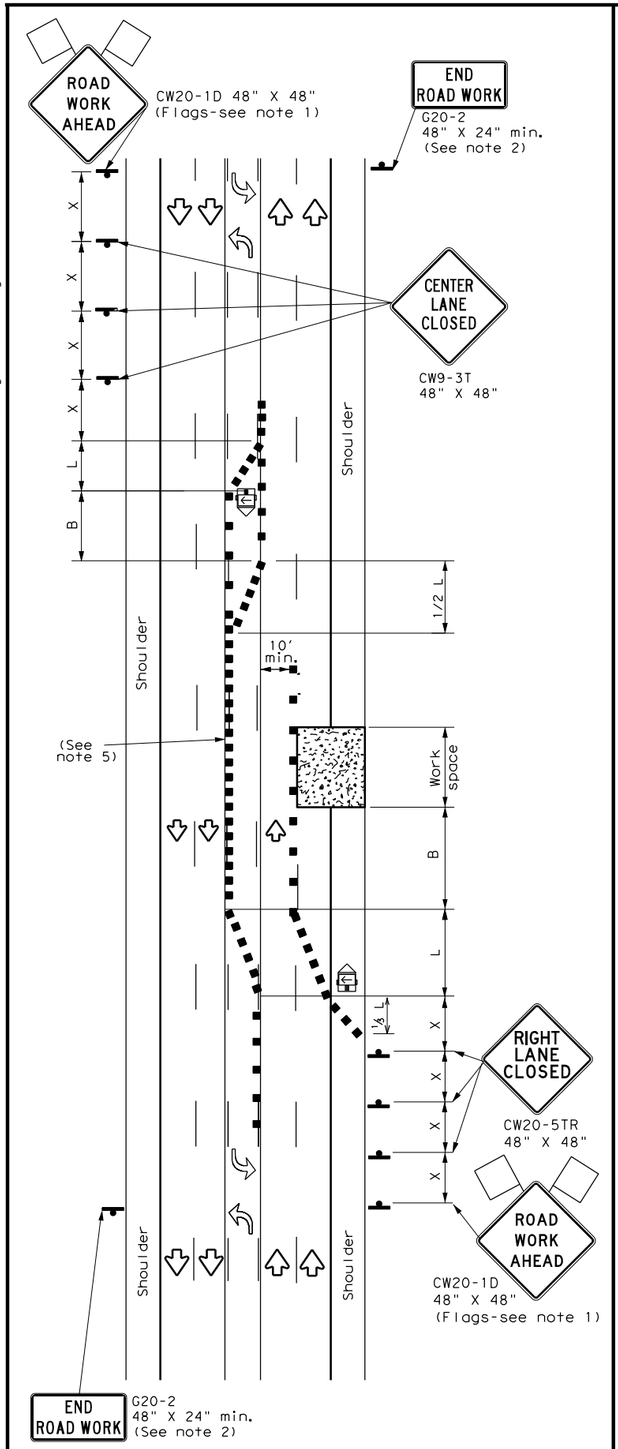
TRAFFIC CONTROL PLAN SEALCOAT OPERATIONS MULTILANE ROADS (UNDIVIDED)

TCP(SC-2)-22

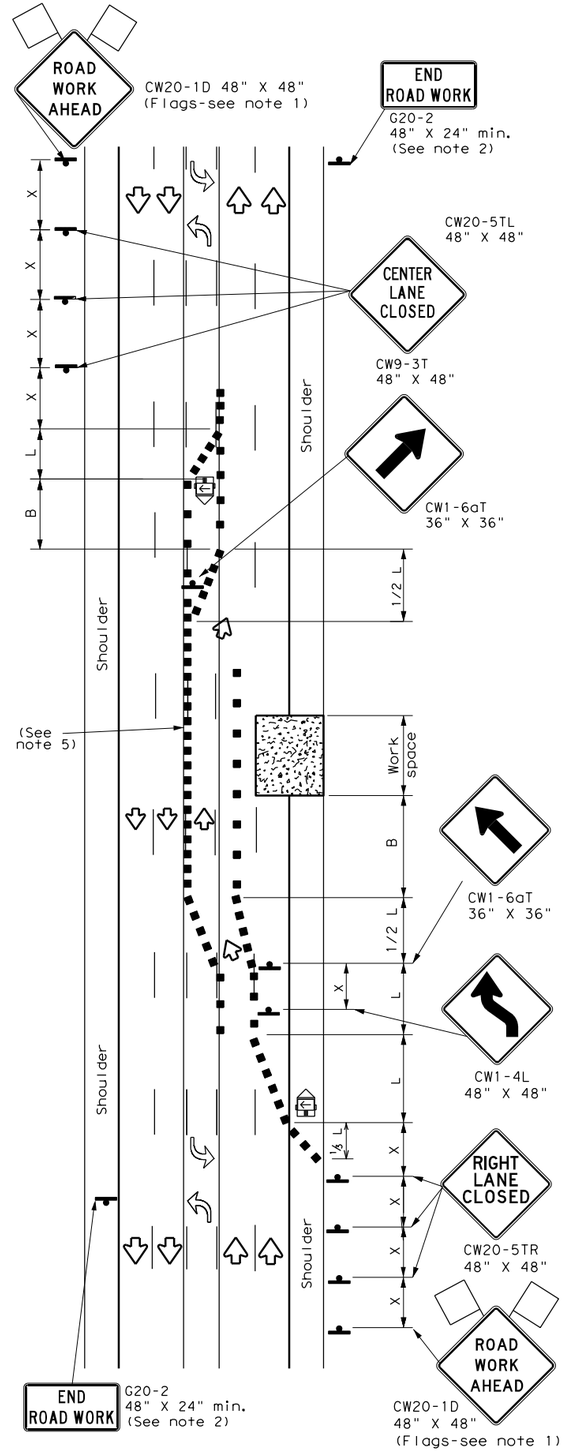
FILE: tcpsc-2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		40

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

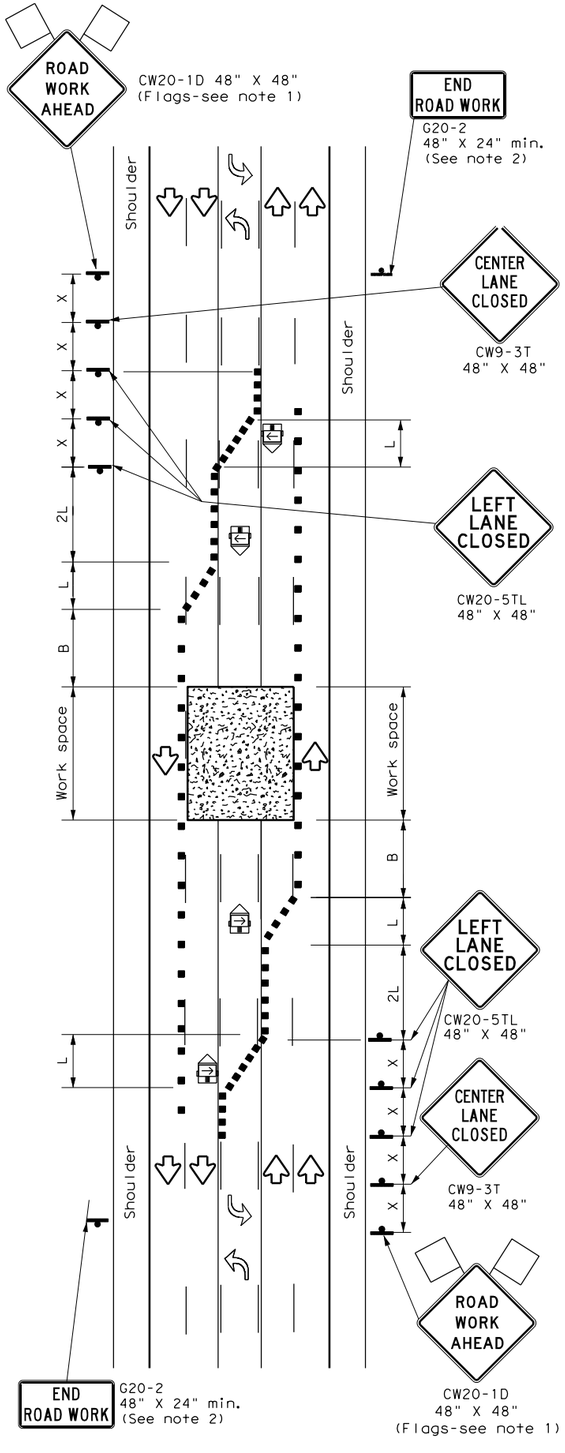
DATE: 3/13/2024 $TIME$
FILE: $FILE$



TCP(SC-3a)
ONE LANE CLOSED
CONTROL W/ CHANNELIZING DEVICES



TCP(SC-3b)
TWO LANES CLOSED
CONTROL W/ CHANNELIZING DEVICES



TCP(SC-3c)
CENTER LANES CLOSED
CONTROL W/ CHANNELIZING DEVICES

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing Distance "X"	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L = Length of Taper (FT) W = Width of Offset (FT)
S = Posted Speed (MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personal (flaggers) at the intersection.
4. Temporary rumble strips are not required on seal coat operations.

TCP (SC-3a) and (SC-3b)

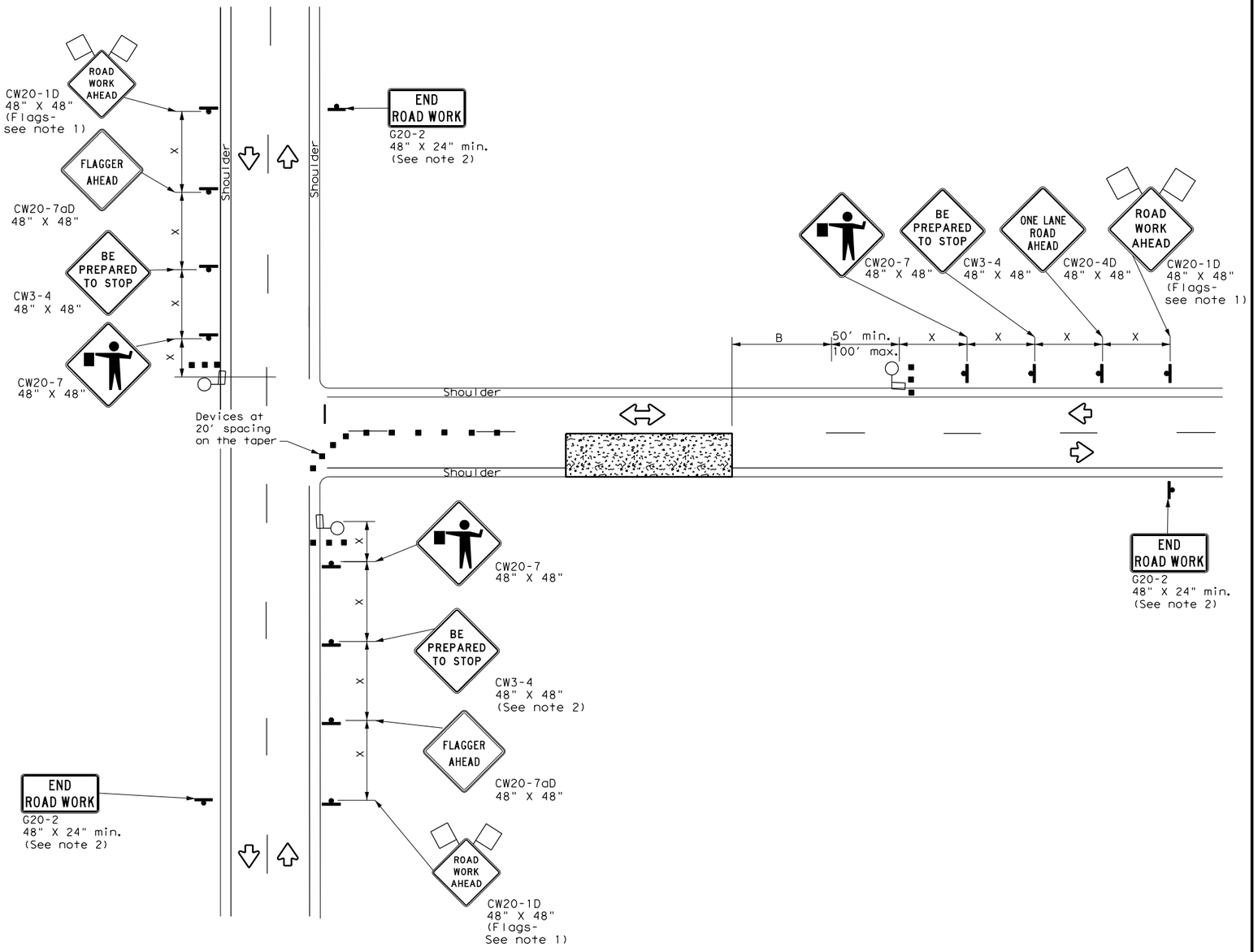
5. Channelizing devices which separate two-way traffic shall be spaced on tapers at:
   a.) 20 feet;
   b.) 15 feet when posted speeds are 35 mph or slower; or
   c.) at 1/2(S) for tangent sections.
   This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation | Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS MULTILANE ROADS (W/ CENTER LEFT TURN LANE)

TCP(SC-3)-22

FILE: tcpsc-3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
4-21	DIST	COUNTY		SHEET NO.
10-22	YKM	COLORADO		41



ONE LANE TWO-WAY (T-INTERSECTION) CONTROL WITH PILOT VEHICLE

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only

** Taper lengths have been rounded off.

L = Length of Taper (FT) W = Width of Offset (FT) S = Posted Speed (MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
4. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
5. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
6. Temporary rumble strips are not required on seal coat operations.
7. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

Texas Department of Transportation

Traffic Safety Division Standard

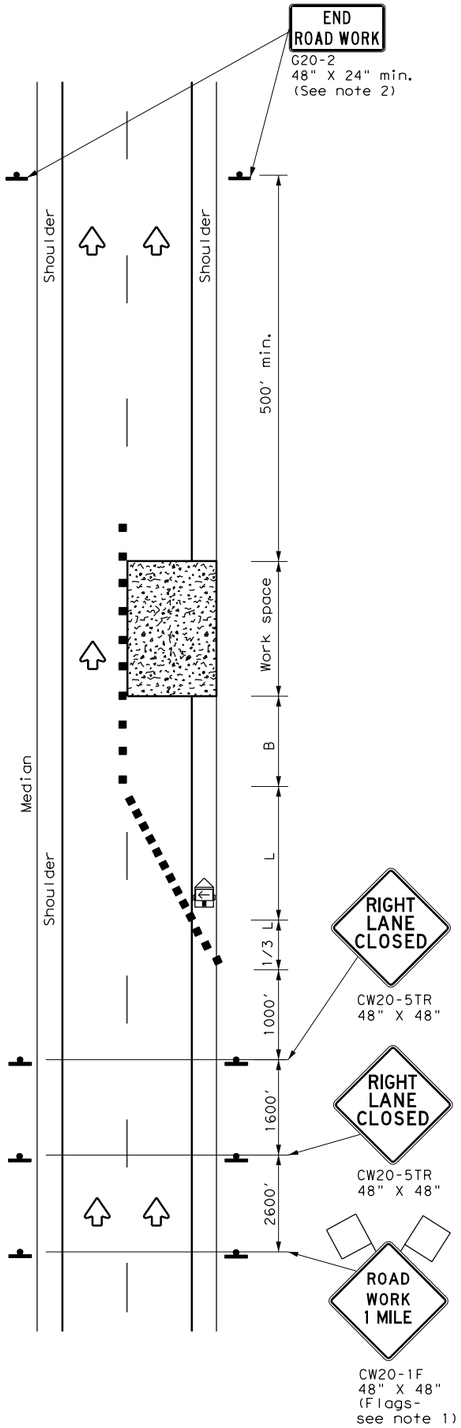
TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS NEAR INTERSECTION

TCP(SC-4)-22

FILE: tcpsc-4-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		42

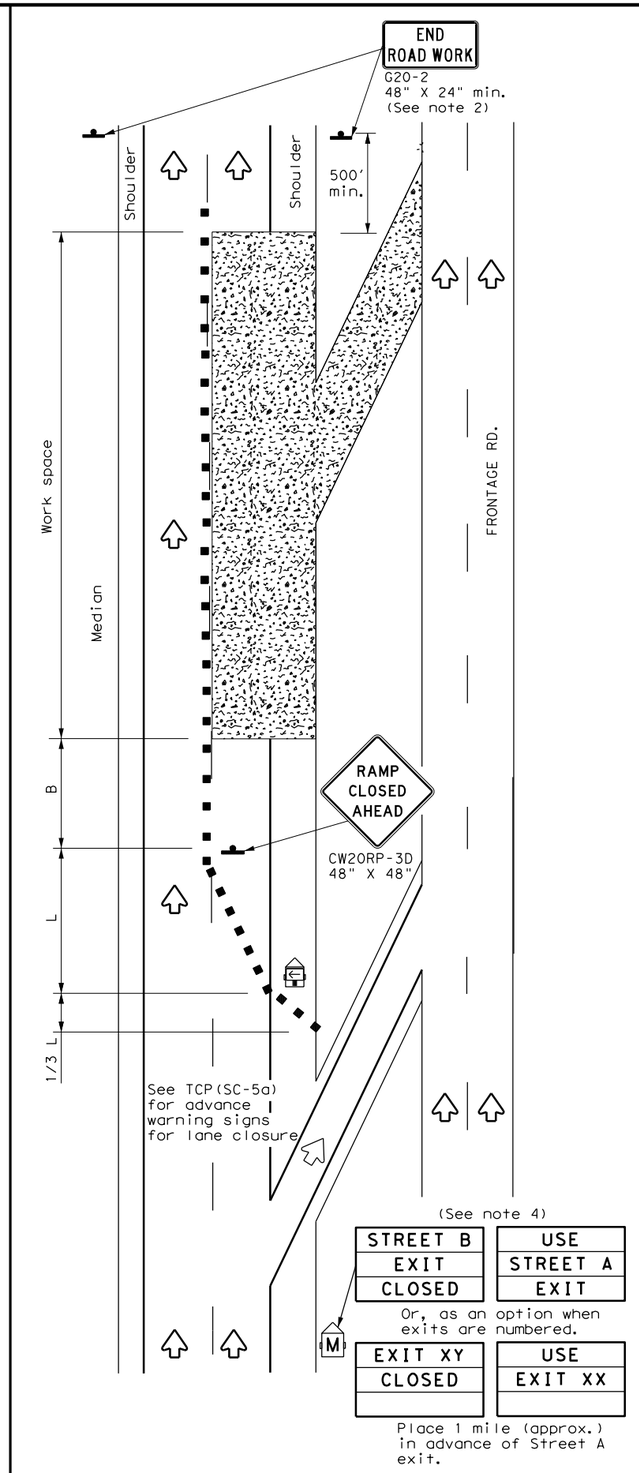
220

DATE: 3/13/2024 $TIME$
FILE: $FILE$



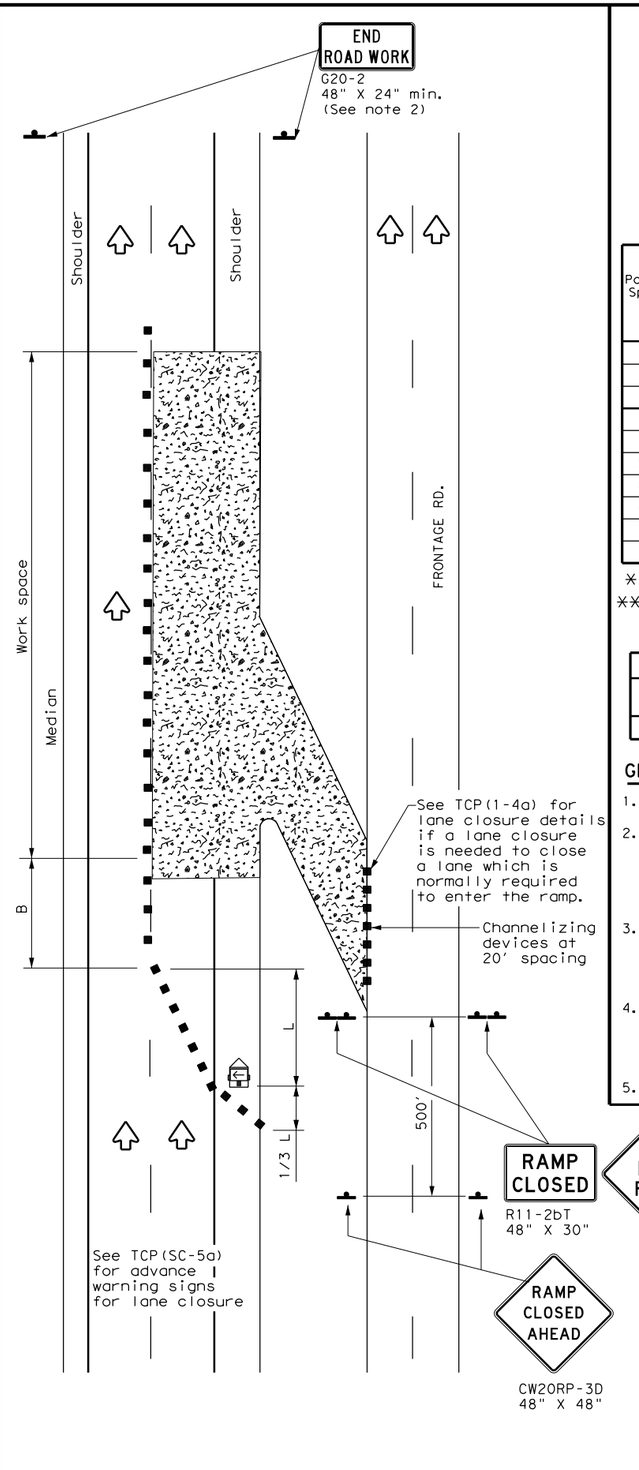
TCP (SC-5a)

ONE LANE CLOSURE



TCP (SC-5b)

LANE AND RAMP CLOSURE AT EXIT RAMPS



TCP (SC-5c)

LANE AND RAMP CLOSURE AT ENTRANCE RAMPS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing Distance "X"	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L = Length of Taper (FT) W = Width of Offset (FT)
S = Posted Speed (MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓		

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except:
   - If project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
   - USE NEXT RAMP (CW25-1T) sign is optional with approval by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. The PCMS may be omitted if: it is replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in the appropriate location to display a similar message as called for on the PCMS.
5. Temporary rumble strips are not required on seal coat operations.

Texas Department of Transportation

Traffic Safety Division Standard

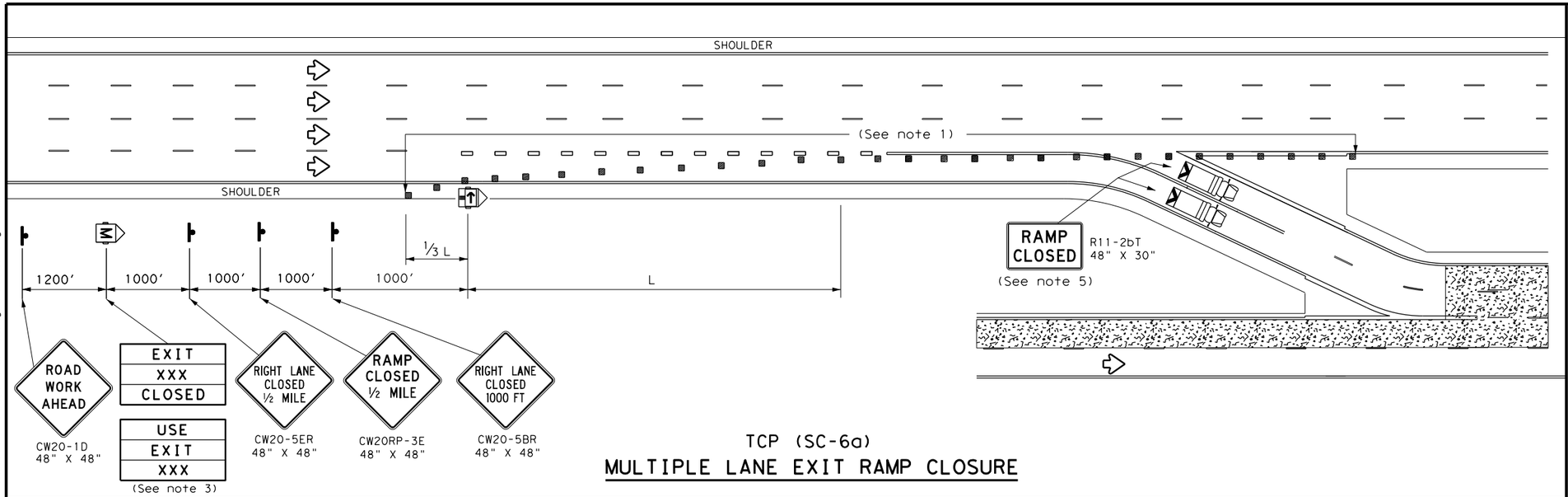
TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS DIVIDED HIGHWAYS

TCP(SC-5)-22

FILE: tcpsc-5-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		43

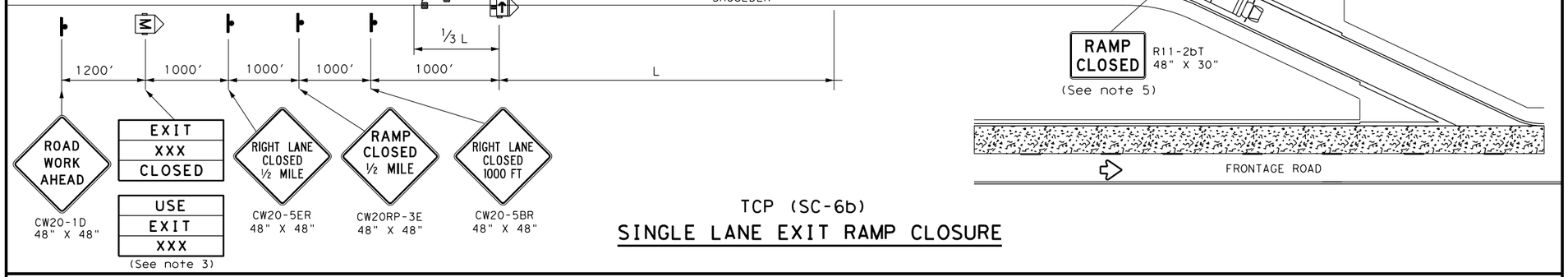
221

DATE: 3/13/2024 $TIME$
FILE: $FILE$



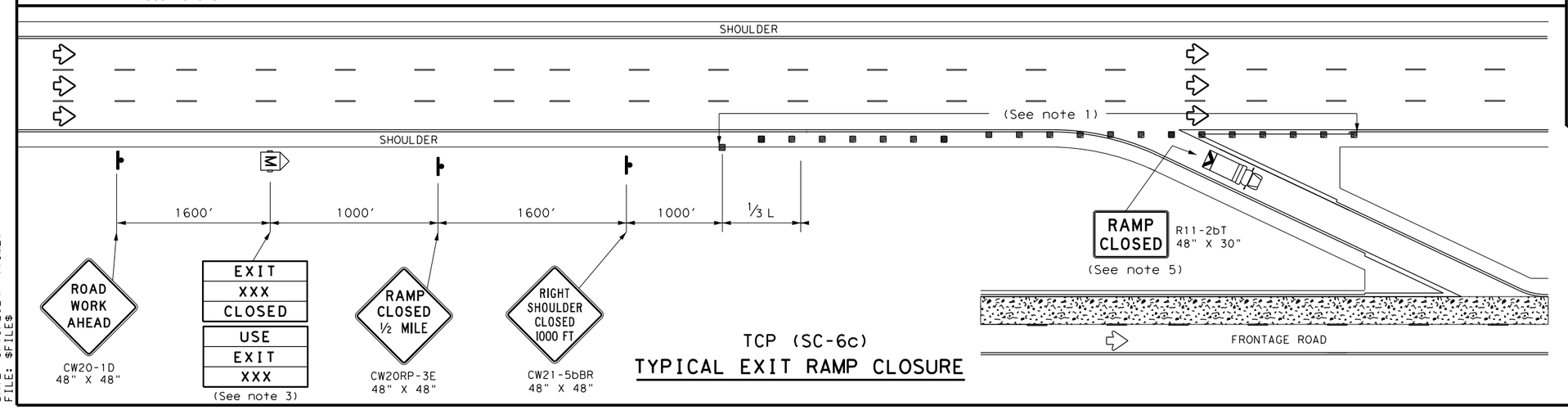
TCP (SC-6a)

MULTIPLE LANE EXIT RAMP CLOSURE



TCP (SC-6b)

SINGLE LANE EXIT RAMP CLOSURE



TCP (SC-6c)

TYPICAL EXIT RAMP CLOSURE

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ✻✻			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10′ Offset	11′ Offset	12′ Offset	On a Taper	On a Tangent	
45	L=WS	450′	495′	540′	45′	90′	195′
50		500′	550′	600′	50′	100′	240′
55		550′	605′	660′	55′	110′	295′
60		600′	660′	720′	60′	120′	350′
65		650′	715′	780′	65′	130′	410′
70		700′	770′	840′	70′	140′	475′
75		750′	825′	900′	75′	150′	540′
80		800′	880′	960′	80′	160′	615′
85		850′	935′	1020′	85′	170′	695′

✻✻ Taper lengths have been rounded off.
L = Length of Taper (FT) W = Width of Offset (FT)
S = Posted Speed (MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Place channelizing devices at 20′ spacings. Tighter spacing allowed as necessary to address field conditions or observed driver behavior.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted if replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. A Truck Mounted Attenuator (TMA), where shown, is REQUIRED and shall have a RAMP CLOSED (R11-2bT) sign mounted on the rear of the truck.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS DIVIDED HIGHWAYS

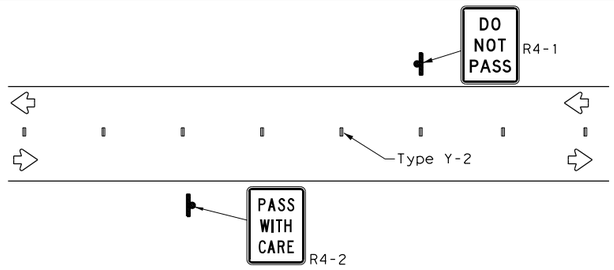
TCP(SC-6)-22

FILE: tcpsc-6-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-22	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		44

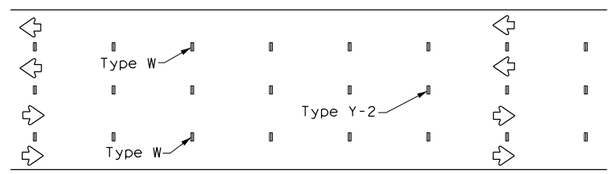
DATE: 3/13/2024 $TIME$
FILE: $FILE$

DATE: 3/13/2024
FILE: $FILE$

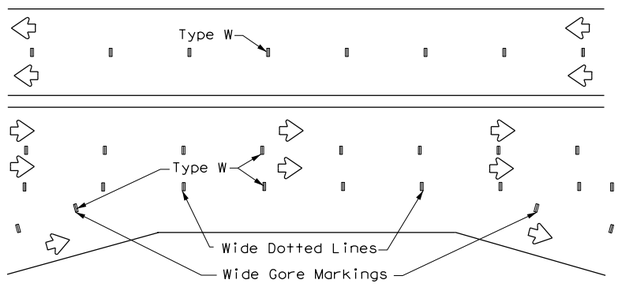
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



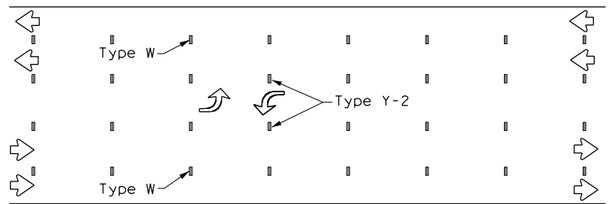
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS

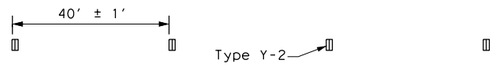
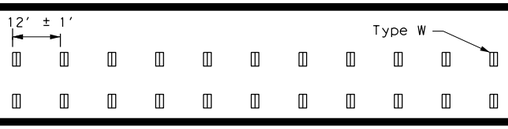


LANE LINES FOR DIVIDED HIGHWAY

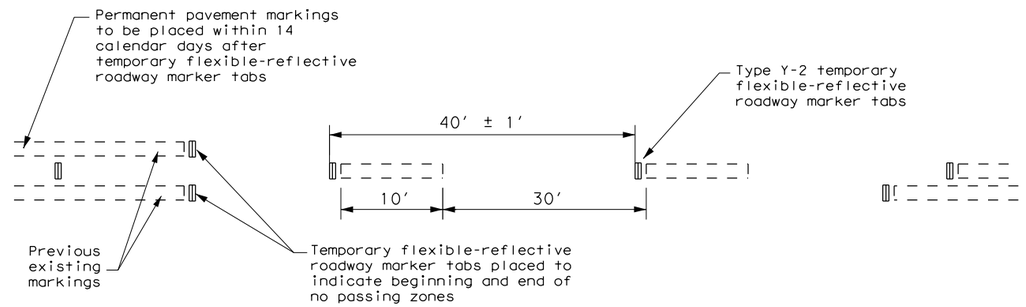


TWO-WAY LEFT TURN LANE

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)

SOLID LINES	DOUBLE NO-PASSING LINE	
	SINGLE NO-PASSING LINE or CHANNELIZATION LINE	
	8" WIDE SOLID LINE	
BROKEN LINES (FOR CENTER LINE OR LANE LINE)		
WIDE DOTTED LINES (FOR LANE DROP LINES)		
WIDE GORE MARKINGS		

TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS



TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

1. Temporary markings for surfacing projects shall be Temporary Flexible-Reflective Roadway Marker Tabs with protective cover unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two days before the surfacing is applied. After the surfacing is rolled and swept, the protective cover over the reflective strip shall be removed.
2. Temporary Flexible-Reflective Roadway Marker Tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with a yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
3. Temporary Flexible-Reflective Roadway Marker Tabs will require normal maintenance replacement when used on roadways with an Average Daily Traffic (ADT) per lane of up to 7500 vehicles with no more than 10% truck mix. When roadway volumes exceed these values, additional maintenance replacement of these devices should be planned for.
4. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low- beam head light at night, unless sight distance is restricted by roadway geometrics.
5. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 4.
6. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
7. Tabs shall NOT be used to simulate edge lines.

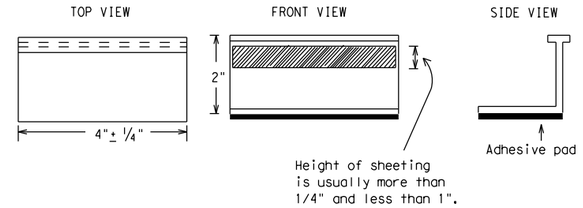
NOTES:

1. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
2. For exit gores where a lane is being dropped, place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are NOT acceptable.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as ¼ inch, unless otherwise noted.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above may be found along with embedded links to their respective MPLs at the following website: http://www.txdot.gov

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS



Texas Department of Transportation

Traffic Safety Division Standard

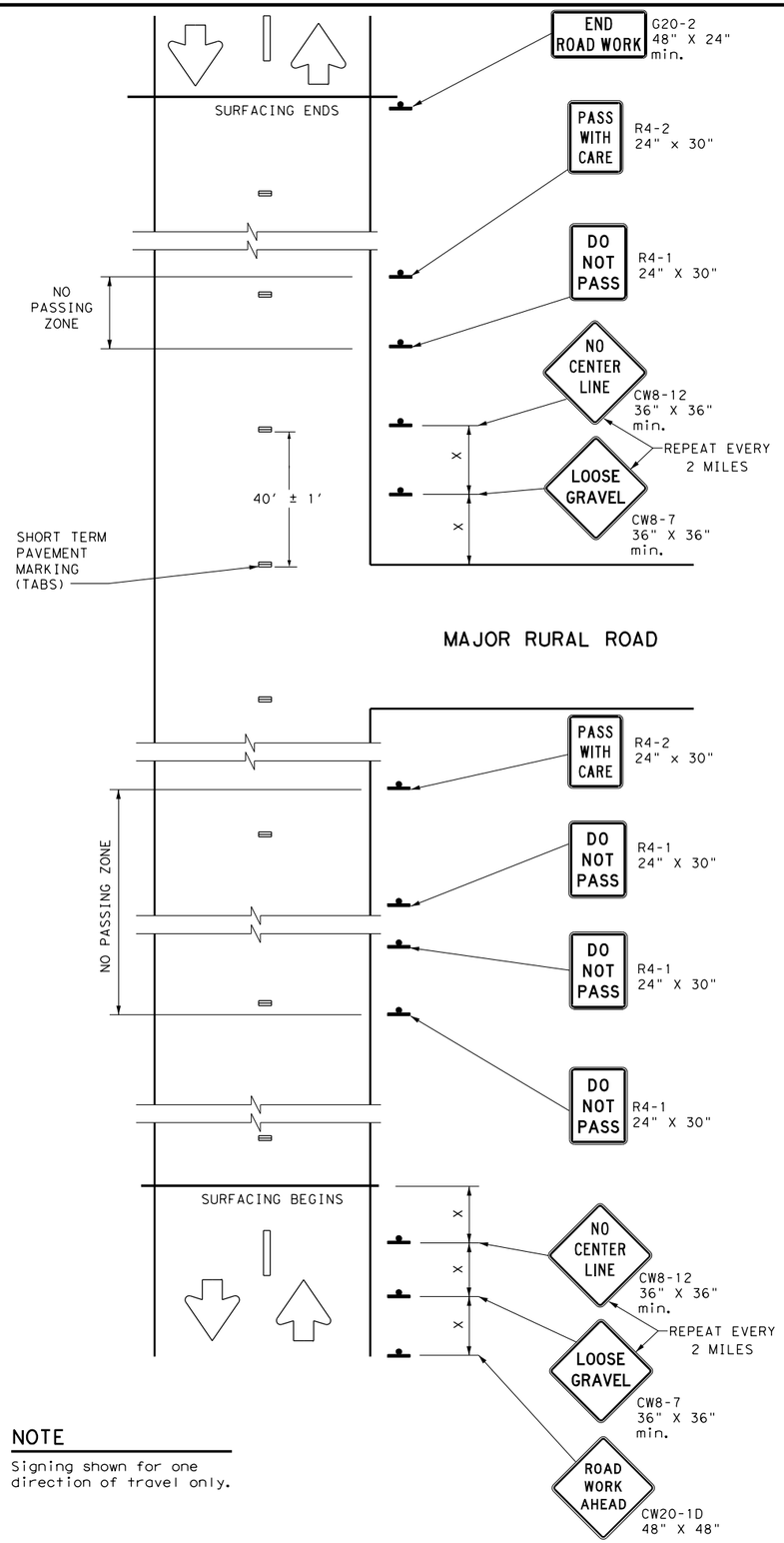
TEMPORARY PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

TCP(SC-7)-22

FILE:	tcpsc-7-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS		0027	01	042	US 90
4-21		DIST	COUNTY		SHEET NO.
10-22		YKM	COLORADO		45

223

DATE: 3/13/2024 $TIME$
FILE: $FILE$



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS

DO NOT PASS (R4-1) SIGN and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel, except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibitd over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is a considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshields and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one day of operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. DO NOT PASS and PASS WITH CARE signs are to remain in place until permanent pavement markings are installed.

NO CENTER LINE (CW8-12) SIGN

A. Center line markings are yellow pavement markings that delineate the separation between lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing center line), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately two mile intervals within the work area, beyond major intersections, and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until permanent pavement markings are installed.

LOOSE GRAVEL (CW8-7) SIGN

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately two miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible, the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed:
   a.) In the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) sign and the TRAFFIC FINES DOUBLE (R20-5T) sign; and
   b.) One "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing.

LOOSE GRAVEL and NO CENTER LINE sign placements will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing Distance "X"
30	120′
35	160′
40	240′
45	320′
50	400′
55	500′
60	600′
65	700′
70	800′
75	900′

* Conventional Roads Only

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Surfacing operations that cover or obliterate existing pavement markings must first have the passing zones clearly marked with tabs as well as having any of the traffic control devices detailed on this sheet furnished and erected as directed by the Engineer.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Short Duration / Short Term Stationary Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways should be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

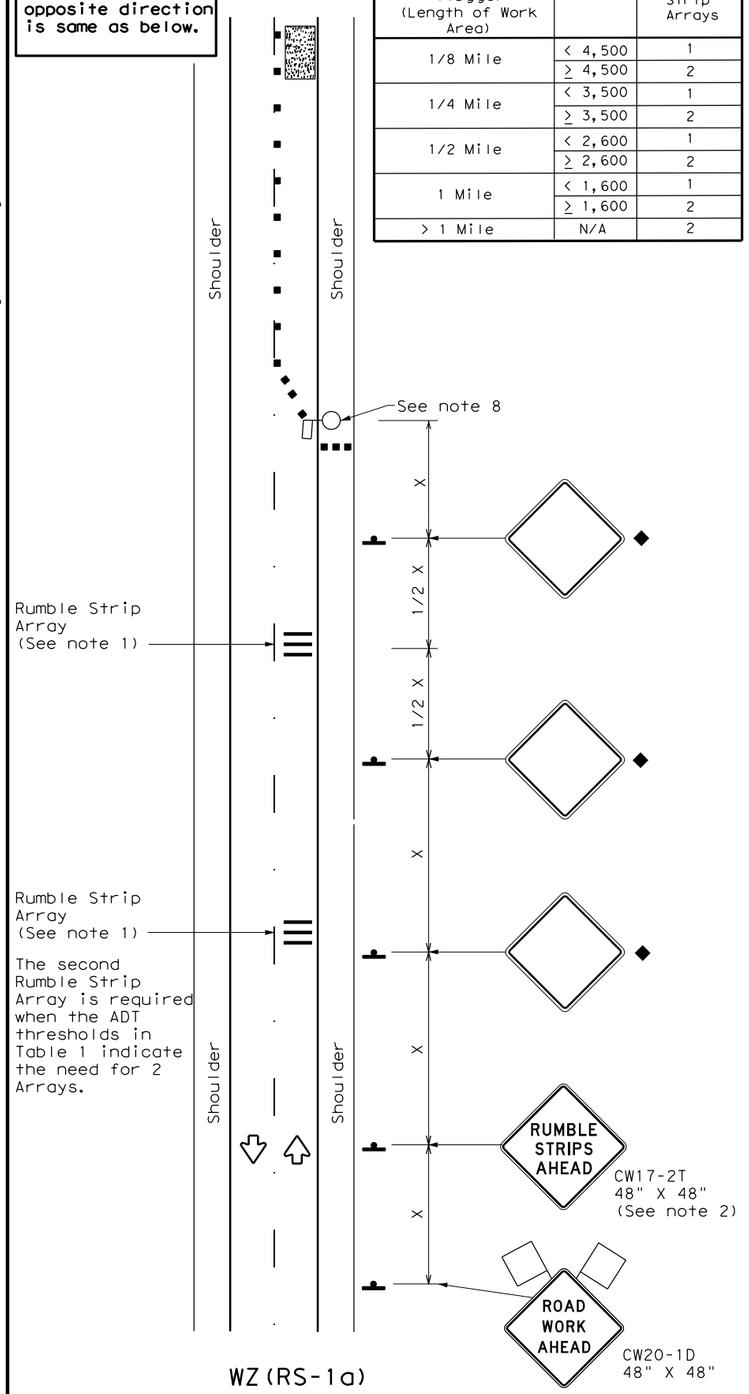
TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS

TCP(SC-8)-22

FILE: tcpsc-8-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
4-21	DIST	COUNTY		SHEET NO.
10-22	YKM	COLORADO		46

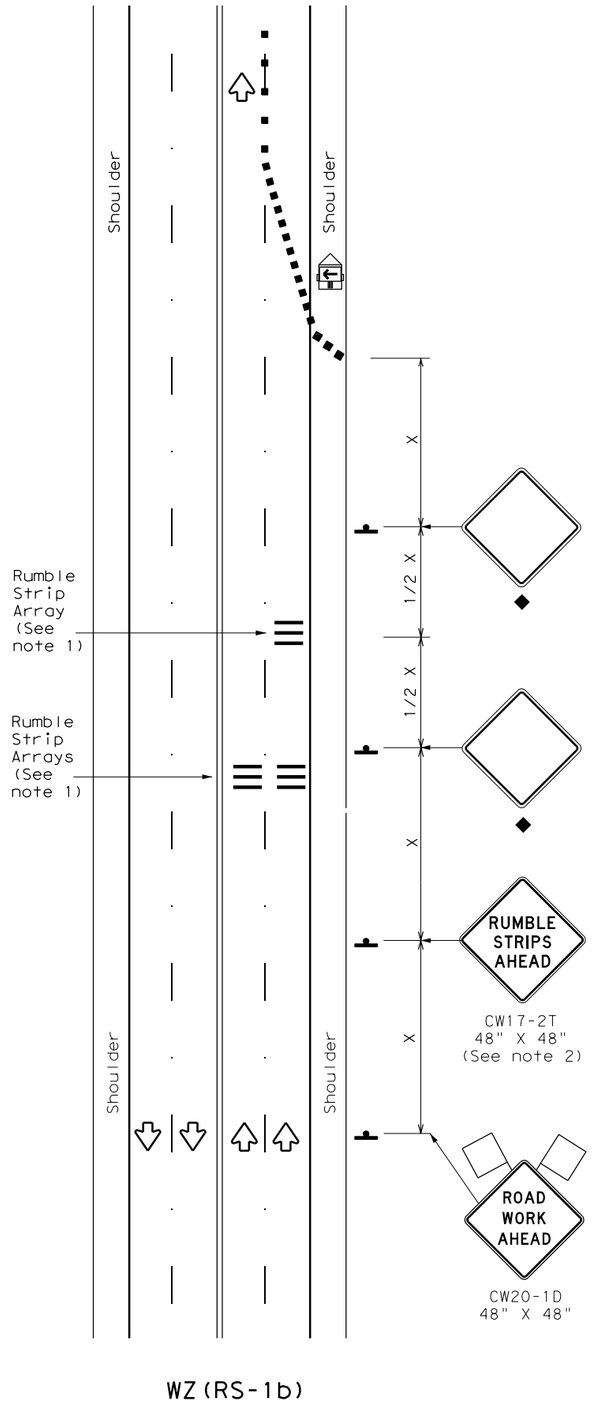
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1		
Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT)
S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

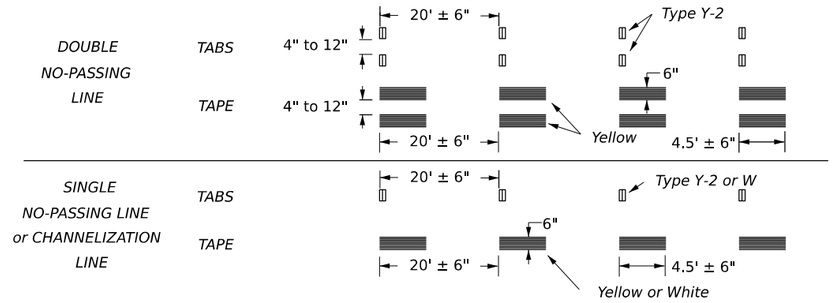
WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		47

117

DATE: 3/13/2024 $TIME$
FILE: $FILE$

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



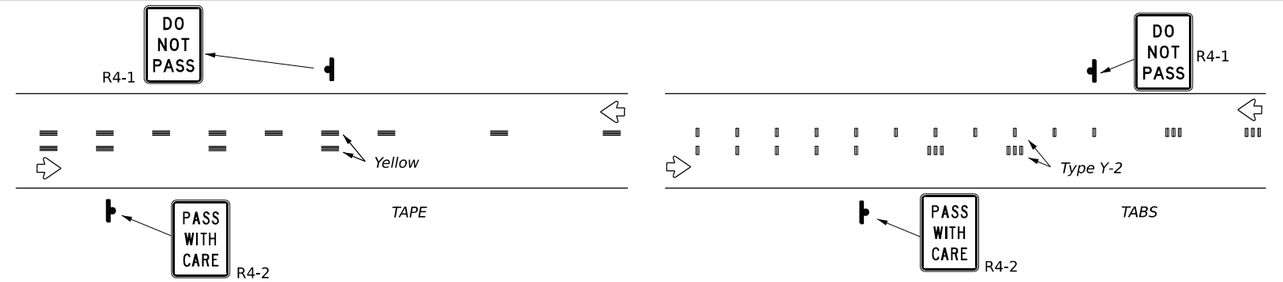
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

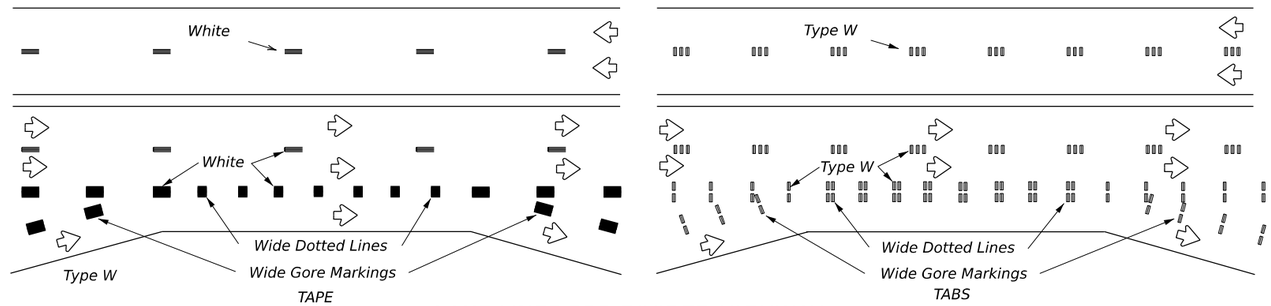
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

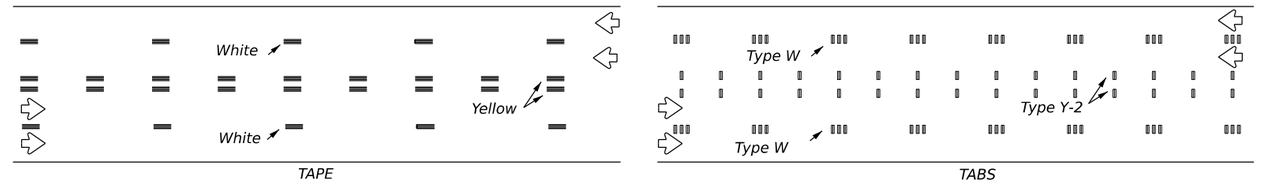
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



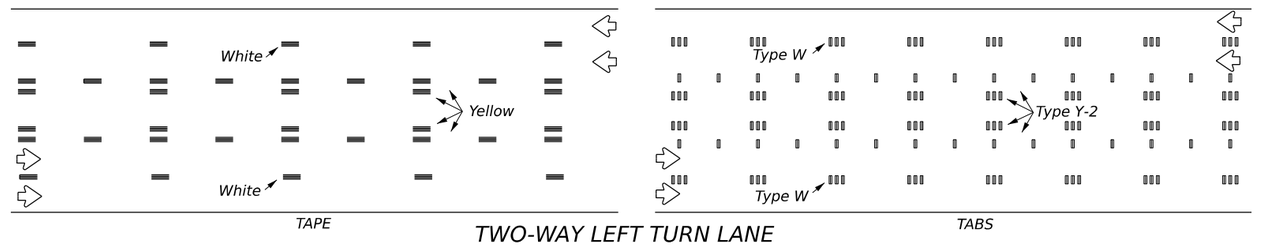
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



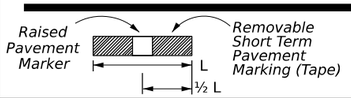
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

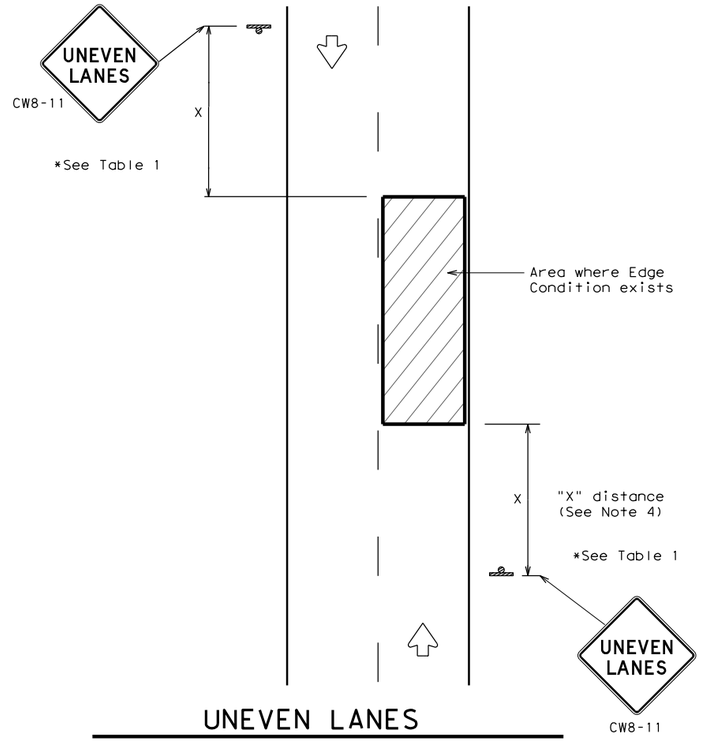
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

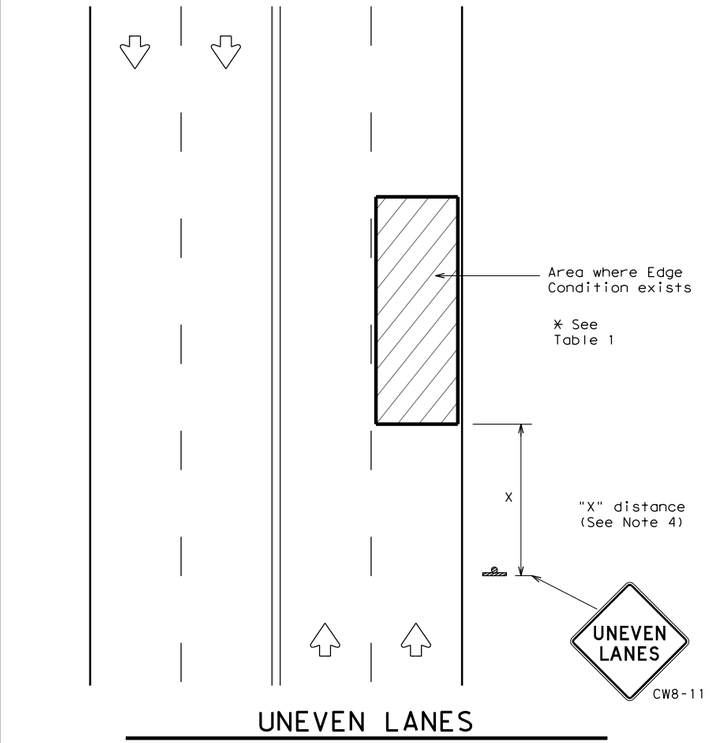
FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		48

DATE: 3/13/2024 $TIME$
FILE: $FILE$

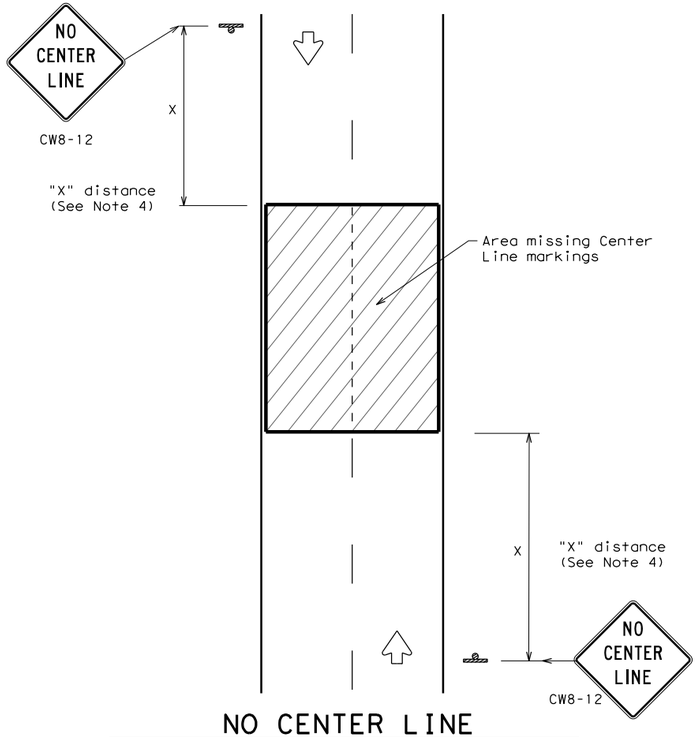
DATE: 3/13/2024 $TIME$
FILE: $FILE$



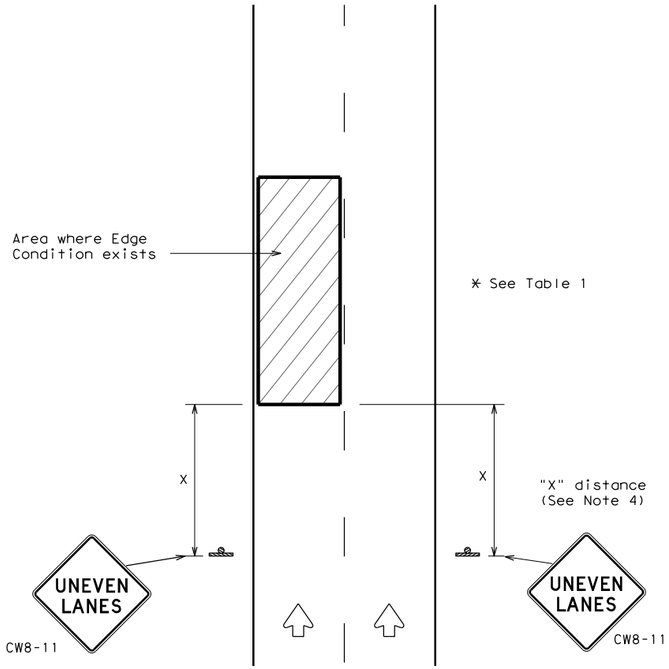
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

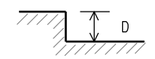
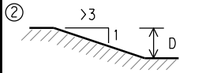
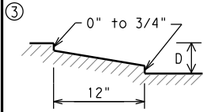
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

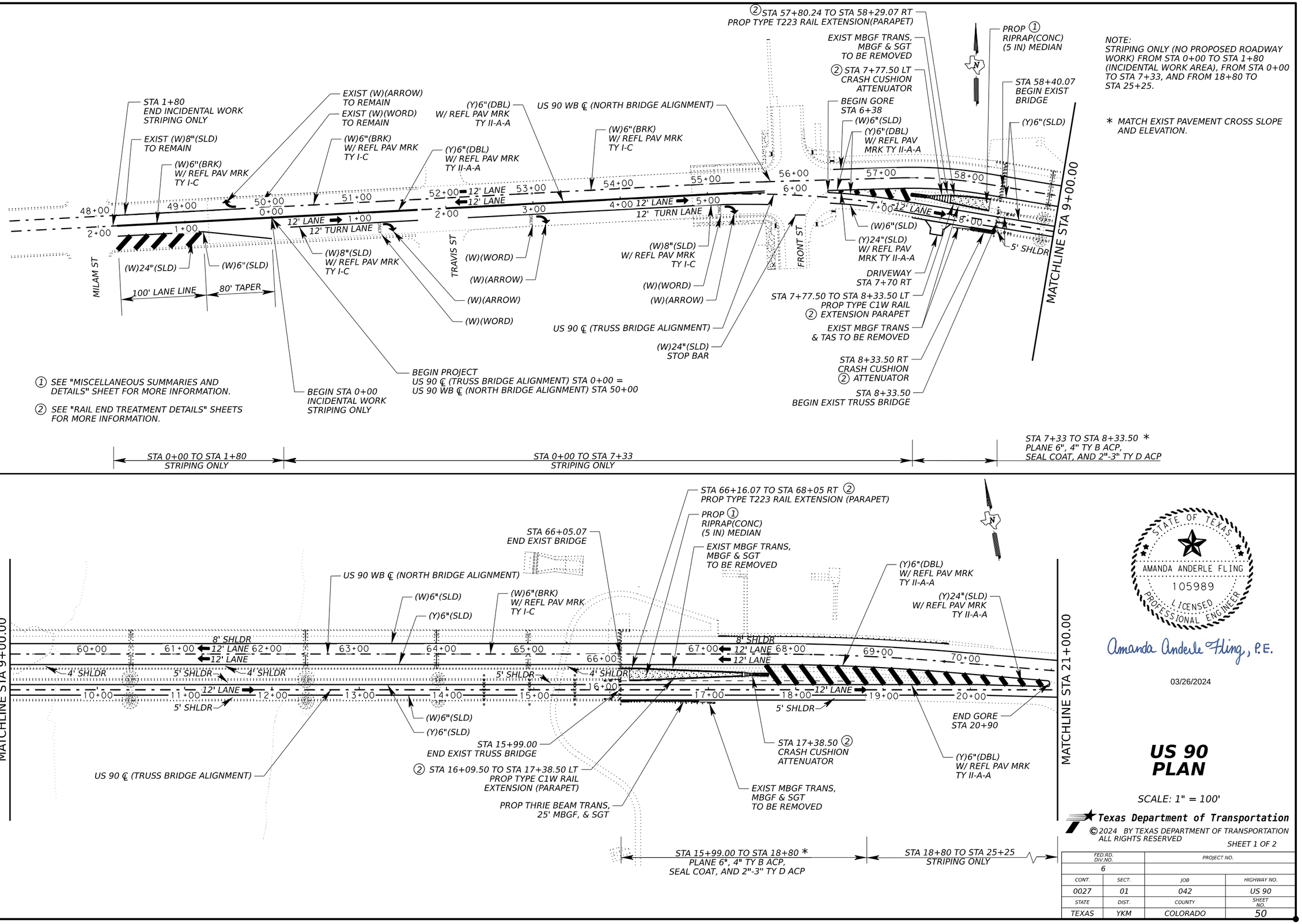
Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	YKM	COLORADO		49



PATH: T:\YKMANNEX\PS&E\0027O1042_US90\Plan_Sheets\
FILE: US 90 PLAN.dgn
DATE: 3/29/2024

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

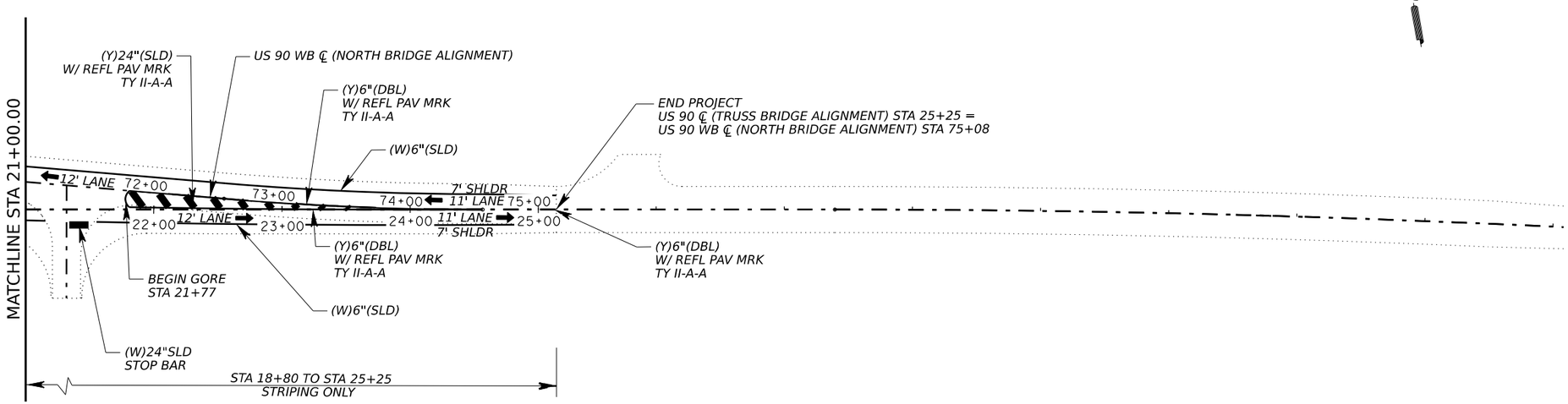
03/26/2024

US 90 PLAN

SCALE: 1" = 100'

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	50



NOTE:
STRIPING ONLY (NO PROPOSED ROADWAY WORK) FROM STA 0+00 TO STA 1+80 (INCIDENTAL WORK AREA), FROM STA 0+00 TO STA 7+33, AND FROM 18+80 TO STA 25+25.

* MATCH EXIST PAVEMENT CROSS SLOPE AND ELEVATION.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

03/26/2024

US 90 PLAN

SCALE: 1" = 100'

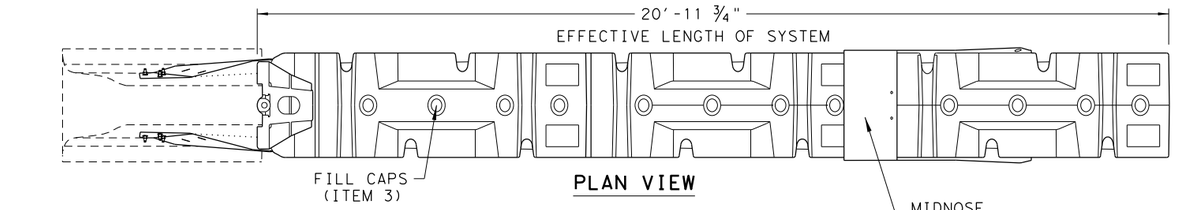
Texas Department of Transportation

SHEET 2 OF 2

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	COLORADO	51

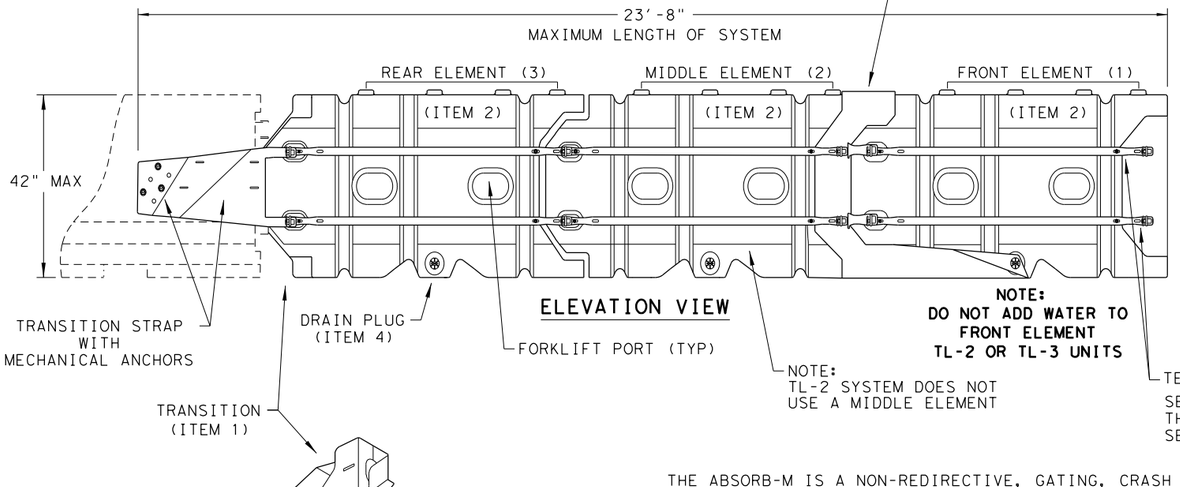
PATH: T:\YKMANNEX\PS&E\002701042_US90\Plan_Sheets\
FILE: US 90 PLAN.dgn
DATE: 3/29/2024

SYSTEM SHOWN - ABSORB-M TL-3



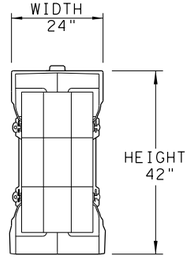
PLAN VIEW

TRAFFIC FLOW

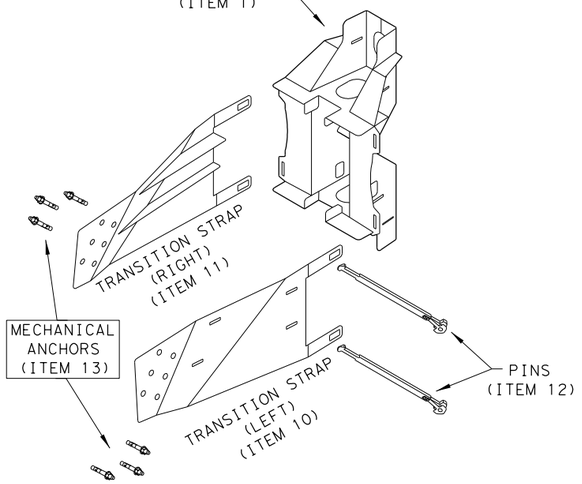


ELEVATION VIEW

TRAFFIC FLOW



SECTION A-A



THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

THE SYSTEM IS DESIGNED TO ACCOMMODATE A VARIETY OF F-SHAPE AND SINGLE SLOPE CONCRETE BARRIERS. CONTACT THE MANUFACTURER FOR GUIDANCE REGARDING OTHER ALLOWABLE SHAPES.

TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

NOTE:
CROSS SLOPES OF UP TO 8% (OR 1:12 SLOPE) CAN BE ACCOMMODATED WITH STANDARD HARDWARE SHOWN WITHIN THE INSTRUCTIONS MANUAL. FOR SLOPES WITH EXCESS OF 8% (OR 1:12) CONTACT, LINDSAY TRANSPORTATION SOLUTIONS.

GENERAL NOTES

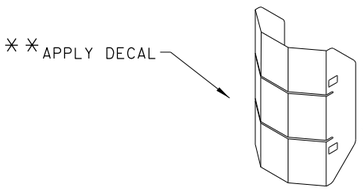
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
* 6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
* 7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER



NOSE PLATE

** NOTE: (PROVIDED BY OTHERS)
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALs ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

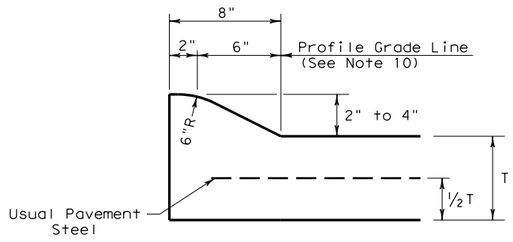
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

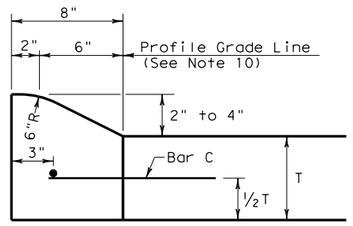
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
REVISIONS	CONT	SECT	JOB	HIGHWAY
	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		52

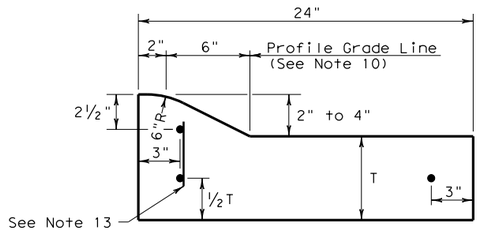
DATE: 3/13/2024
FILE: $FILE$



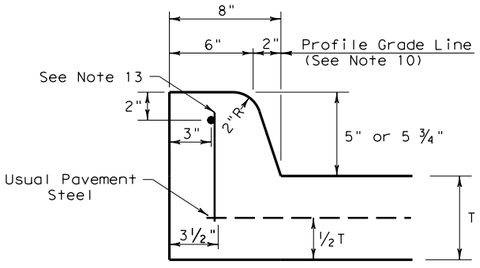
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



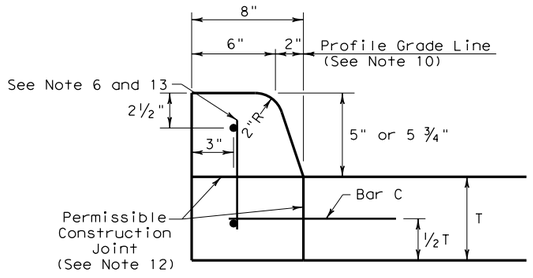
TYPE I CURB
2" - 4" HEIGHT



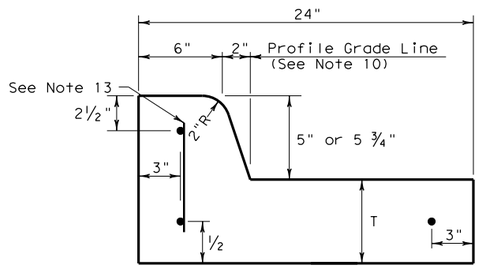
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



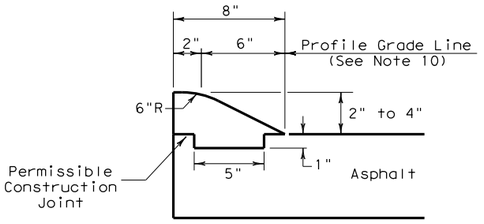
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



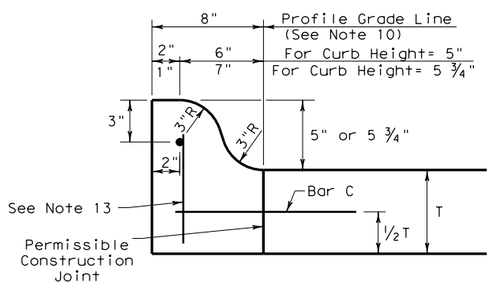
TYPE II CURB
5" - 5 ¾" HEIGHT



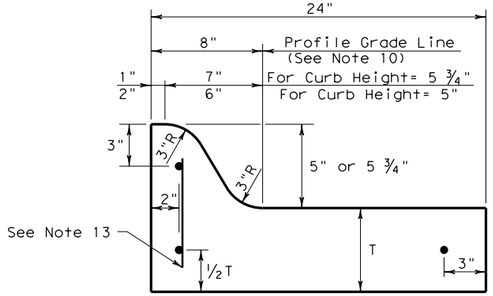
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



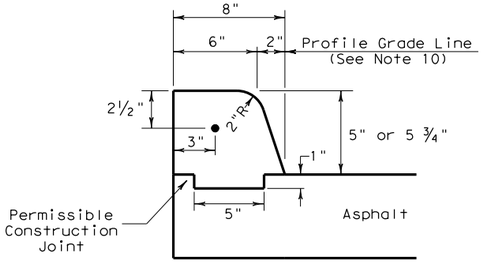
TYPE III CURB (KEYED)
2" - 4" HEIGHT



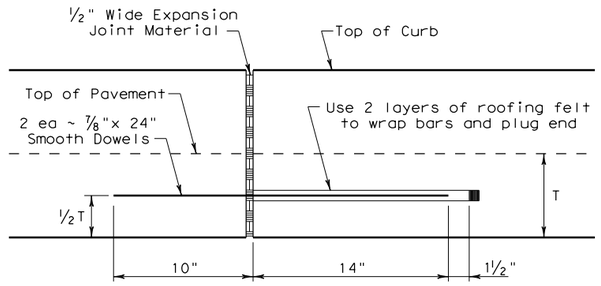
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

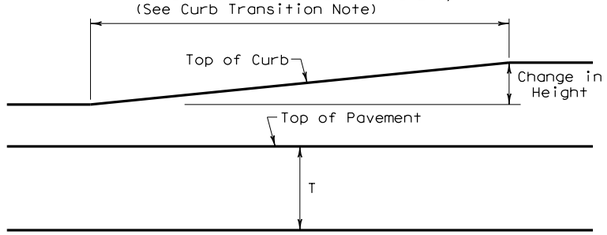


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

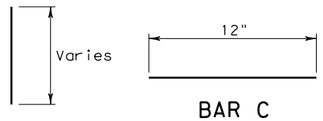
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

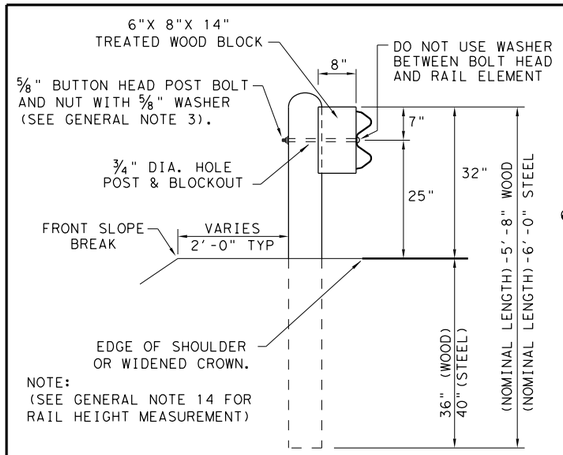
CONCRETE CURB AND CURB AND GUTTER

CCCG-22

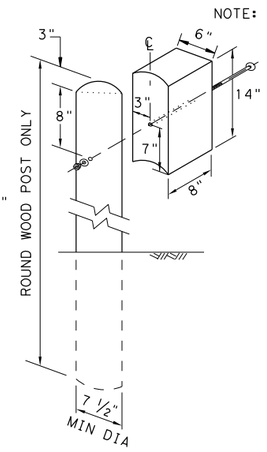
FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
©TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		53

DATE: 3/26/2024
FILE: $FILE$

DATE: 3/26/2024
FILE: $FILE$

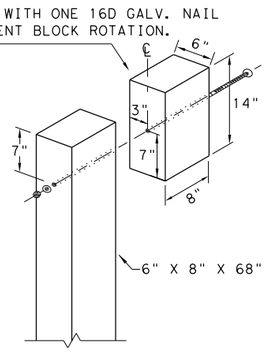


TYPICAL POST PLACEMENT

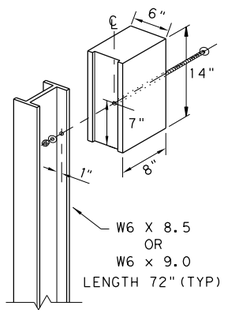


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.

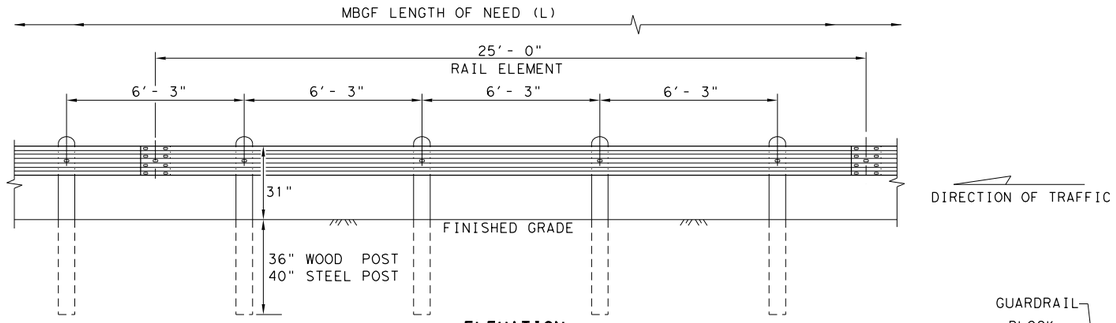


WOOD BLOCK TO RECTANGULAR WOOD POST



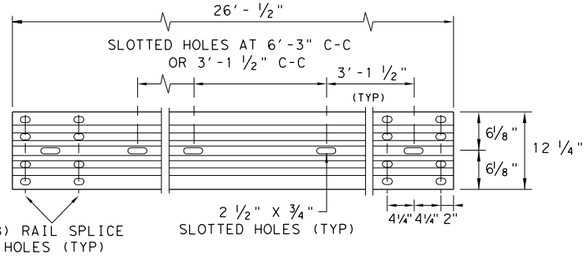
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



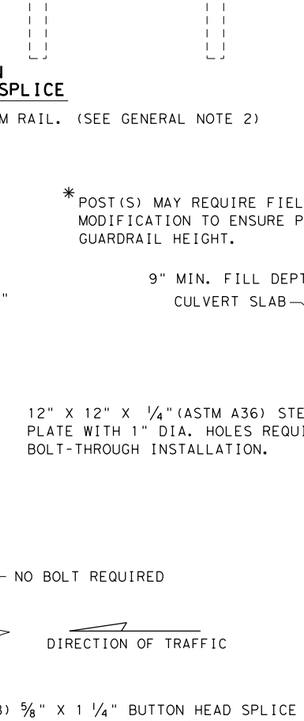
ELEVATION
MID-SPAN RAIL SPLICE

SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



LOW FILL CULVERT POST

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

NOTE: TWO INSTALLATION OPTIONS.

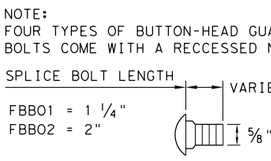
1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.



BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.

MID-SPAN RAIL SPLICE DETAIL

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

GENERAL NOTES

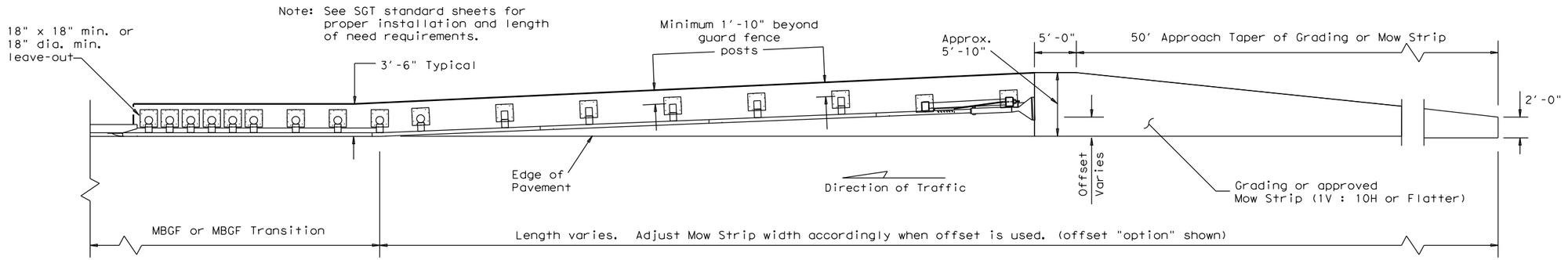
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

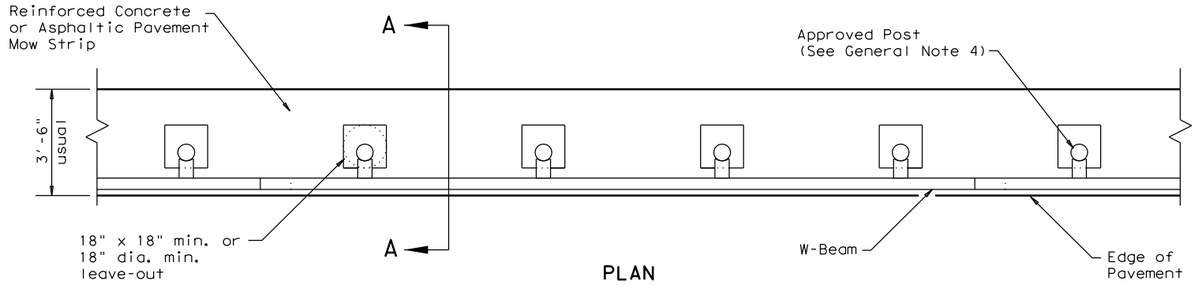
Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0027	01	042	US 90	
	DIST	COUNTY		SHEET NO.	
	YKM	COLORADO		54	

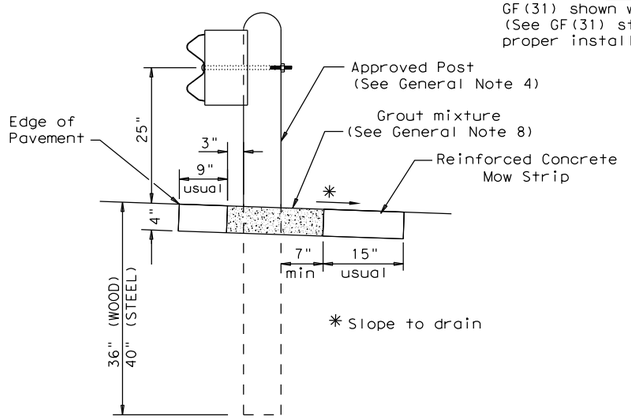


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



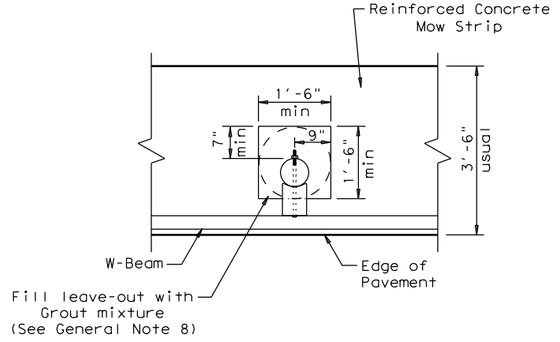
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



SECTION A-A

Typical



MOW STRIP DETAIL

Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

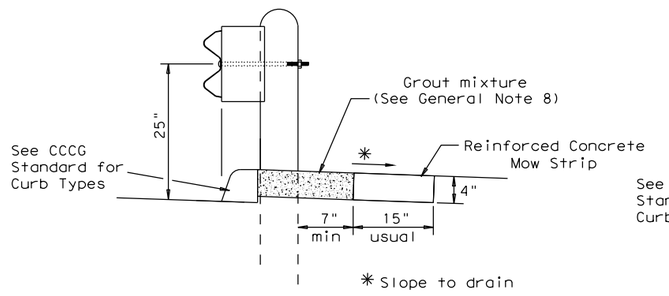
Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

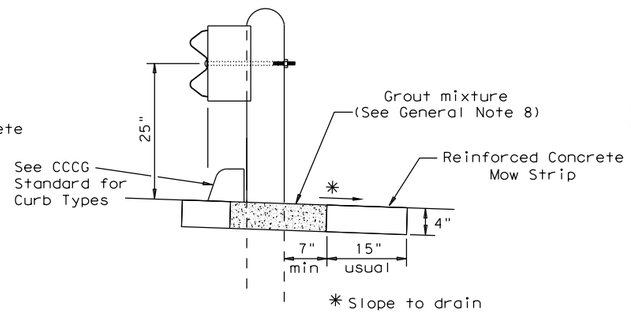
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



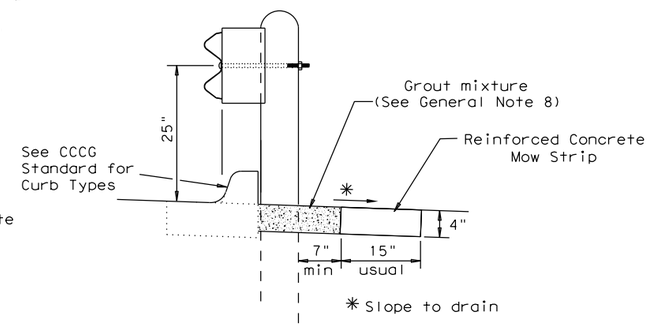
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

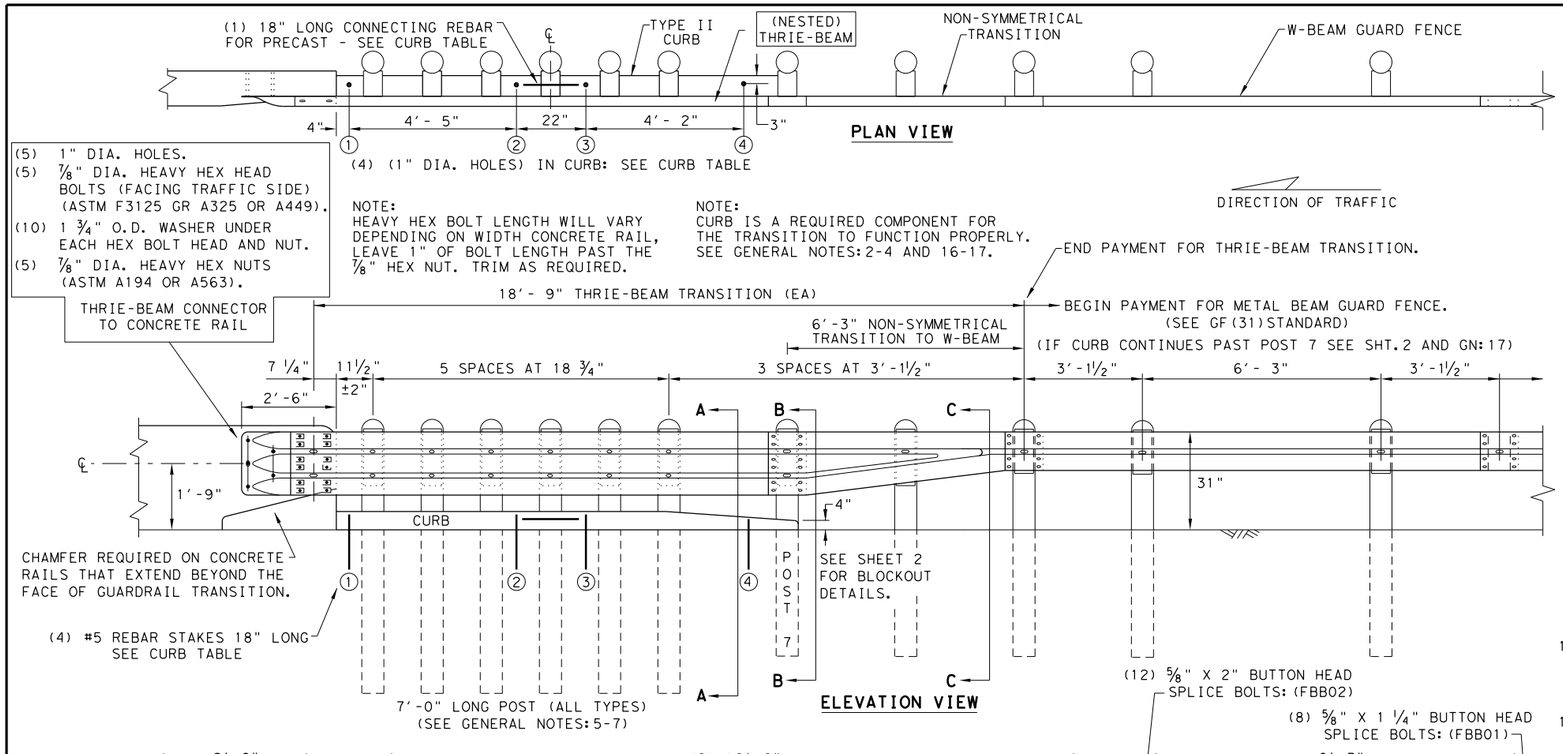
Design Division Standard

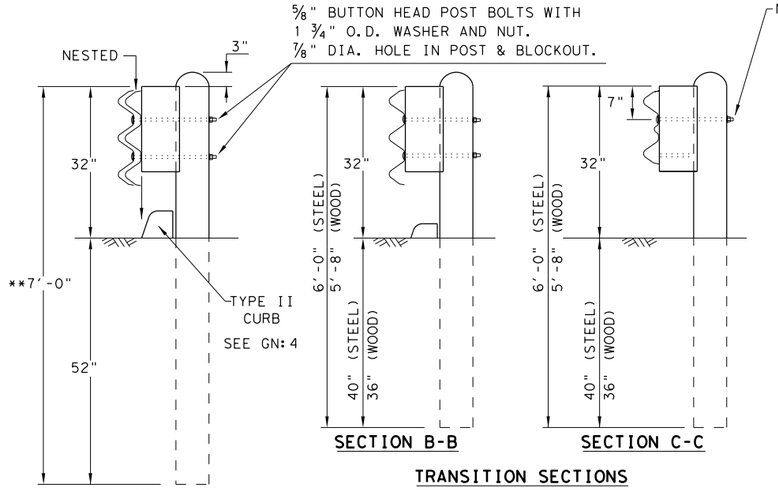
METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

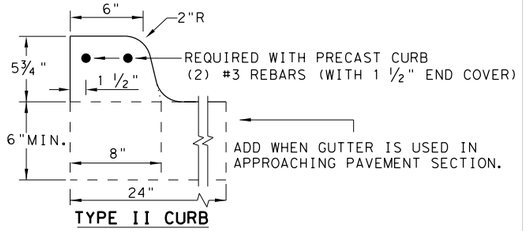
FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		55

DATE: 3/26/2024
FILE: $FILE$





THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

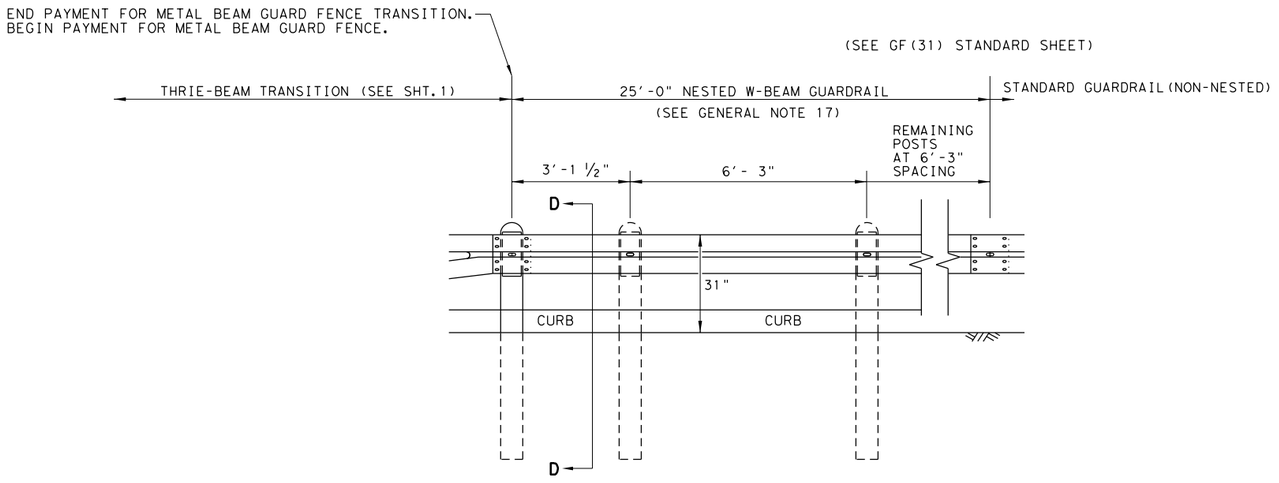
GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0027	01	042		US 90	
	DIST	COUNTY			SHEET NO.	
	YKM	COLORADO			56	

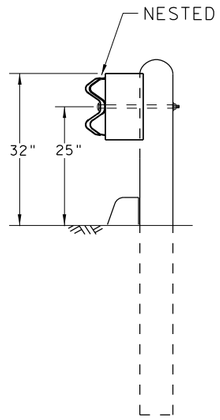
DATE: 3/26/2024
FILE: $FILE$

DATE: 3/26/2024
FILE: $FILE$

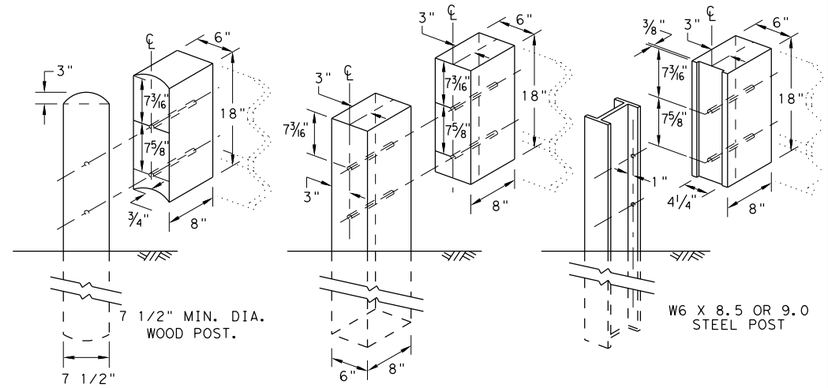
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

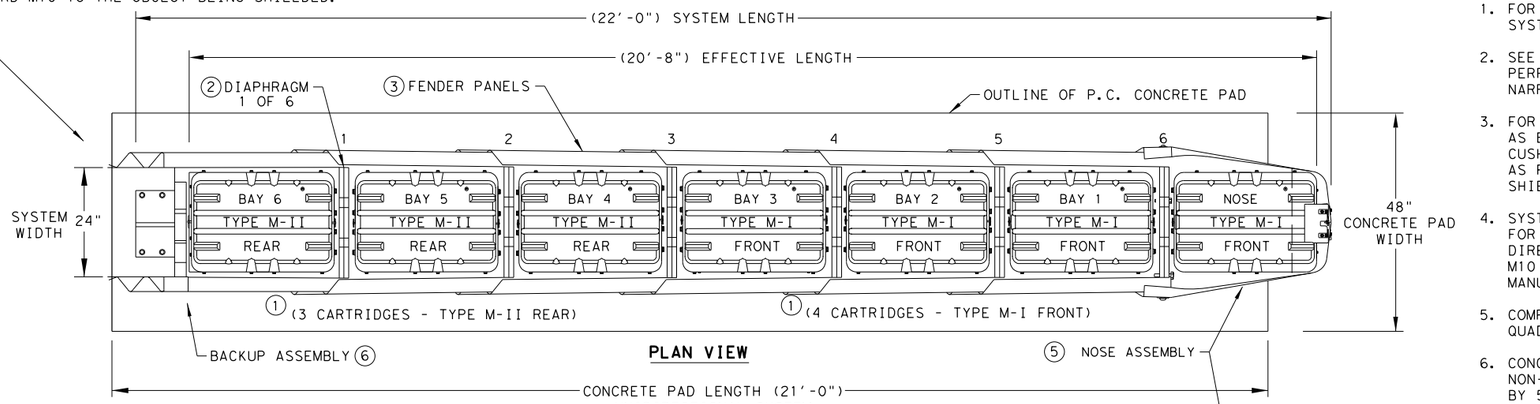
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0027	01	042		US 90	
	DIST	COUNTY			SHEET NO.	
	YKM	COLORADO			57	

NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD M10 TO THE OBJECT BEING SHIELDED.

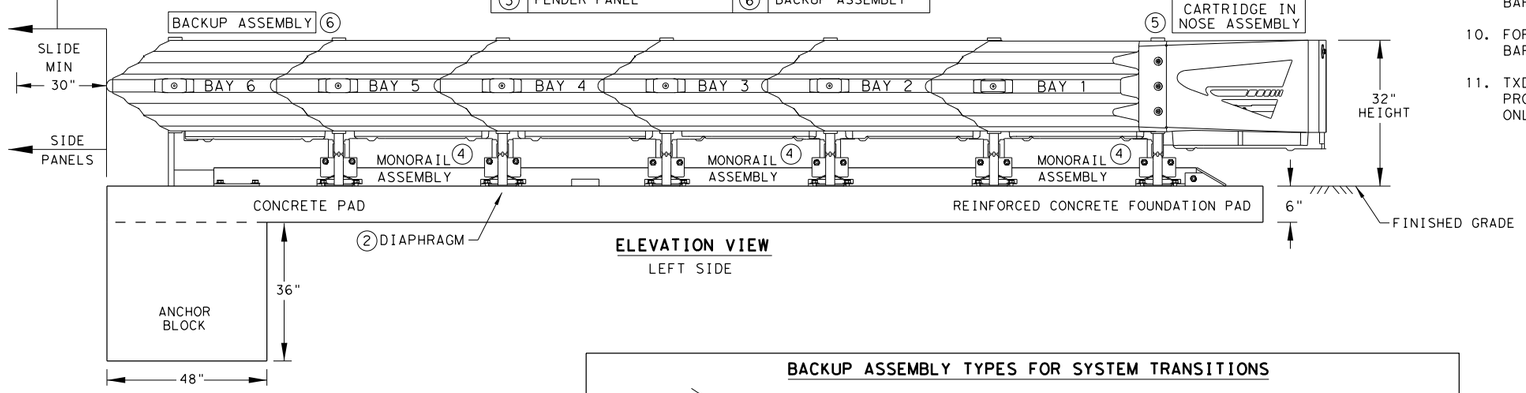
QUADGUARD M10 24" WIDE 6-BAY SYSTEM



PLAN VIEW

KEY		KEY	
(1)	QUADGUARD CARTRIDGE	(4)	MONORAILS
(2)	DIAPHRAGM	(5)	NOSE ASSEMBLY
(3)	FENDER PANEL	(6)	BACKUP ASSEMBLY

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD M10 (N) INSTALATION AND DETAILED INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY FOR THE REQUIRED TRANSITION WILL BE PROVIDED TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

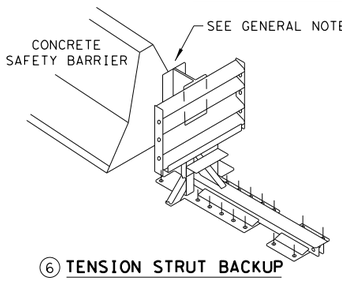
CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD M10 24" WIDE 6-BAY - NARROW SYSTEM HAS BEEN TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024	CARTRIDGE TYPES IN BAYS		
BAYS	6	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	6	3	3	1
WIDTH	24"	REAR	FRONT	NOSE

TL-2 MODEL #	QM7024	CARTRIDGE TYPES IN BAYS		
BAYS	3	TYPE-MII	TYPE-MI	TYPE-MI
DIAPHRAGMS	3	1	2	1
WIDTH	24"	REAR	FRONT	NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



(6) TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD M10 PRODUCT DESCRIPTION ASSEMBLY MANAUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD M10 SYSTEM AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE PLACEMENT OF THE QUADGUARD M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M10 THE CRASH CUSHION MUST BE PLACED SUCH THAT THE TRAFFIC SIDE OF CRASH CUSHION IS AT LEAST AS FAR FROM ADJACENT TRAVEL LANE LINE AS THE TRAFFIC SIDE OF BARRIER/OBJECT BEING SHIELDED.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD M10 BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS,OR DEPRESSIONS.
9. THE QUADGUARD M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. TXDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD M10 SYSTEM. THE QUADGUARD M10 PRODUCT DESCRIPTION AND ASSEMBLEY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

REUSABLE

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M10 (MASH TL-3 & TL-2 NARROW-24"ONLY)

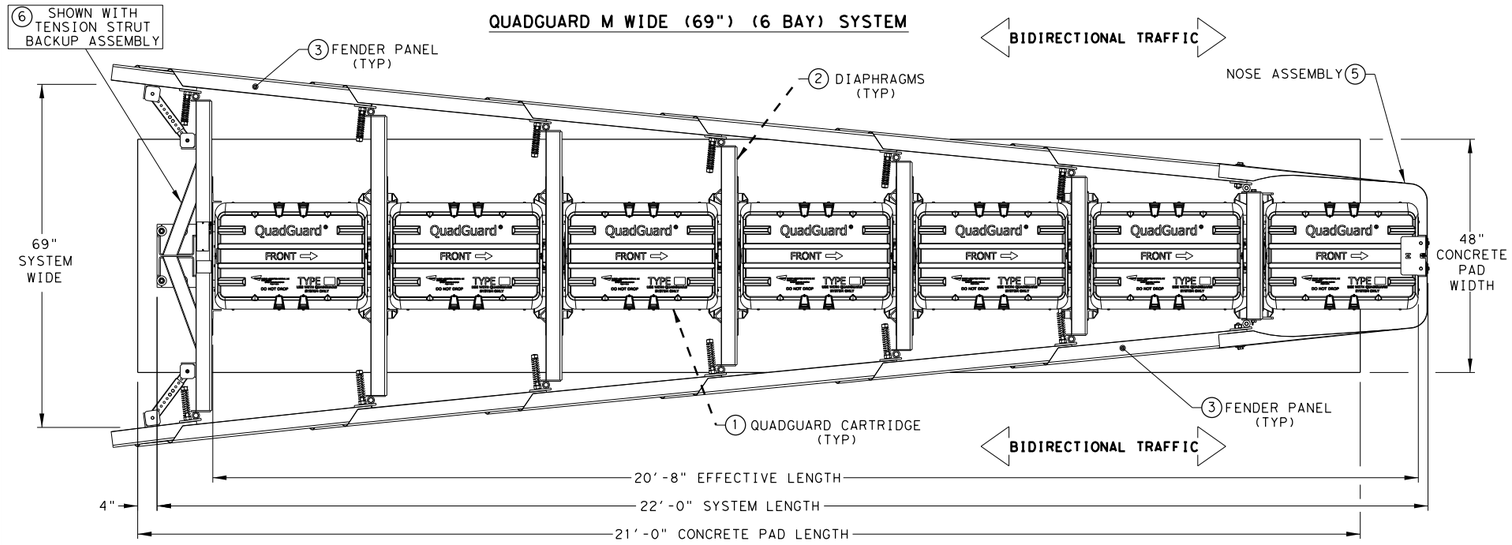
QGUARD(M10)(N)-20

FILE: qguardm10n20.dgn	DN:TxDOT	CK:KM	DW:VP	CK:AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		58

DATE: 3/26/2024
FILE: $FILE$

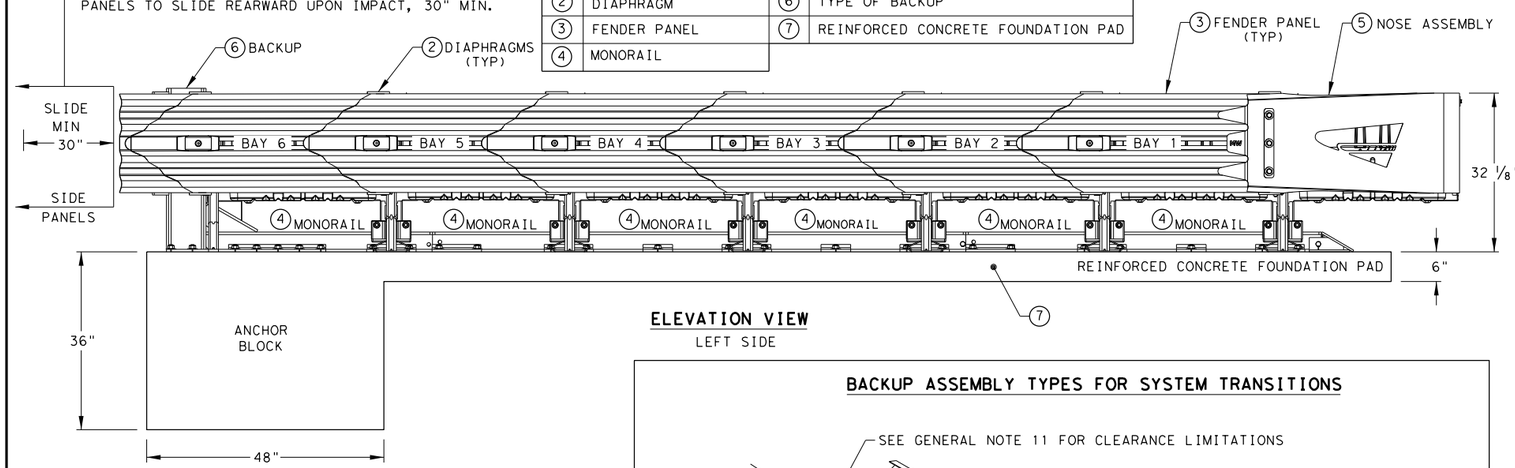
DATE: 3/26/2024
FILE: $FILEL$

QUADGUARD M WIDE (69") (6 BAY) SYSTEM



PLAN VIEW

KEY	DESCRIPTION	KEY	DESCRIPTION
1	QUADGUARD CARTRIDGE	5	NOSE ASSEMBLY
2	DIAPHRAGM	6	TYPE OF BACKUP
3	FENDER PANEL	7	REINFORCED CONCRETE FOUNDATION PAD
4	MONORAIL		



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD M WIDE FIELD INSTALATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

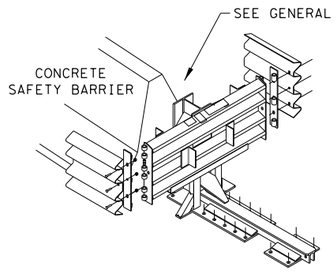
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD M WIDE 6-BAY SYSTEM TESTED TO MASH TL-3.

TL-3 MODEL#	QM10069 (627515)	CARTRIDGE TYPES IN BAYS	
BAYS	6	TYPE I	TYPE II
DIAPHRAGMS	6	4	3
WIDTH	69"	REAR	FRONT

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



6 TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO W-BEAM RAIL
2	QUAD-BEAM TO THRIE-BEAM RAIL
3	QUAD-BEAM TO CONCRETE SAFETY BARRIER
4	QUAD-BEAM TO SINGLE SLOPE BARRIER
5	QUAD-BEAM TO CONCRETE END SHOE
6	QUAD-BEAM TO CONCRETE BRIDGE RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD M WIDE TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374 OR WEBSITE www.trinityhighway.com.
2. SEE THE RECENT QUADGUARD M WIDE PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE SIX (6) BAY WIDE [69"] SYSTEM BEFORE INSTALLING THE QUADGUARD M WIDE AT ANY GIVEN LOCATION.
3. COMPONENTS FOR THE QUADGUARD M WIDE BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
4. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. FOR PERMANENT APPLICATIONS, QUADGUARD M WIDE SHOULD BE ASSEMBLED ON AN EXISTING OR FRESHLY PLACED AND CURED CONCRETE BASE 28MPa [4,000 PSI] MINIMUM. QUADGUARD M WIDE SYSTEM MAY ALSO BE ASSEMBLED ON REINFORCED OR NON-REINFORCED CONCRETE ROADWAY (MINIMUM 8" THICK).
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD M WIDE IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M WIDE, THE QUADGUARD M WIDE SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD M WIDE AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
9. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD M WIDE SYSTEM IS SHIELDING. SEE THE QUADGUARD M WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
10. THE QUADGUARD M WIDE SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
11. FOR THE TENSION STRUT BACKUP, THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
12. THE WIDE QUADGUARD M WIDE SYSTEM IS ONLY AVAILABLE IN A 69" WIDTH AND HAS A 6-BAY SYSTEM THAT HAS BEEN TESTED TO MASH TEST LEVEL 3.
13. IF THE OUTSIDE WIDTH OF OBSTACLE(S) BEING SHIELDED IS 53" OR GREATER, THE OUTSIDE OF OBSTACLE(S) MUST BE CHAMFERED. SEE THE QUADGUARD M WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
14. SEE THE "QUADGUARD M WIDE SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A & B	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH WITH ANCHOR BLOCK (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: B	REINFORCED OR NON-REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	8" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE

KEY:
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

TENSION STRUT BACKUP MAY NOT BE USED IN ASPHALT CONCRETE (A.C.). SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR MORE INFORMATION.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD QG M WIDE SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

REUSABLE

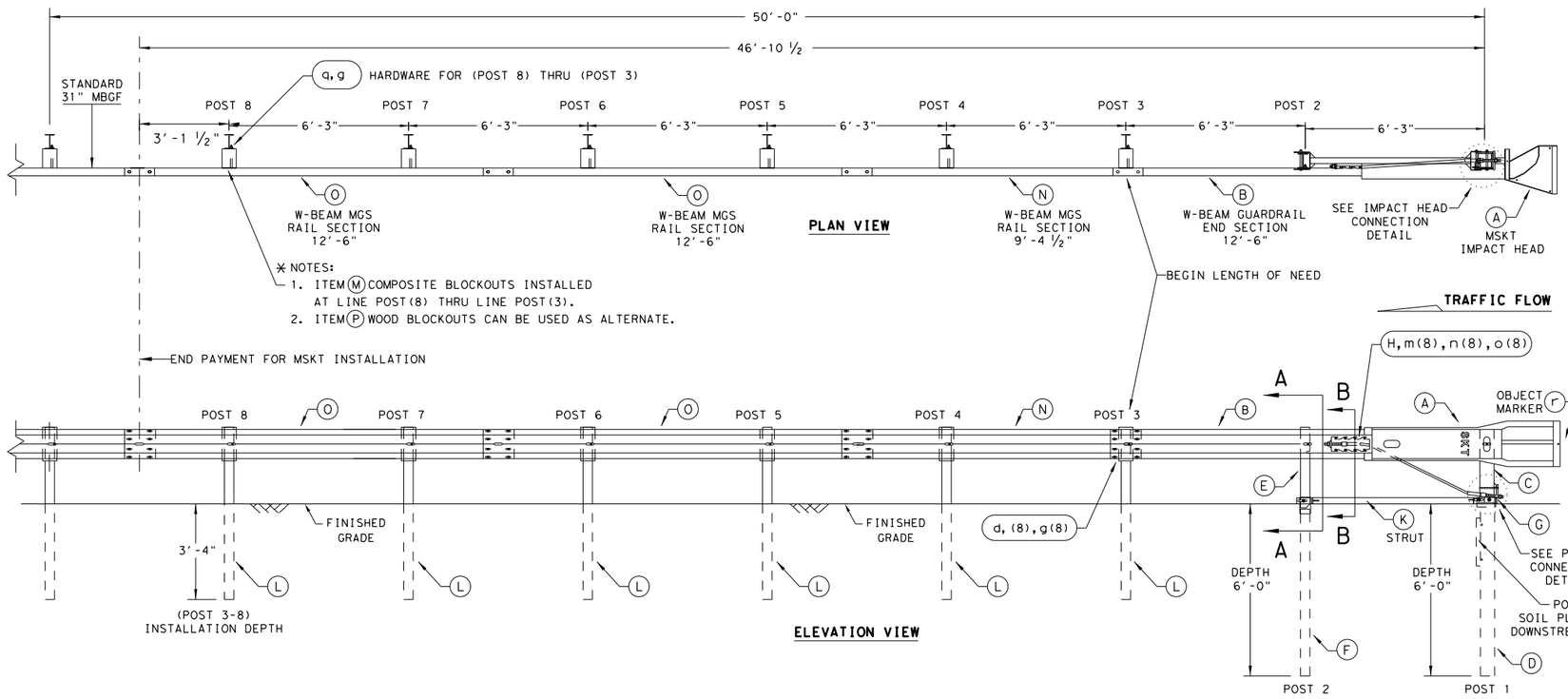
Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M WIDE (MASH TL-3)

QG(M)(W)-21

FILE: qgmw21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: CL
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		59



NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

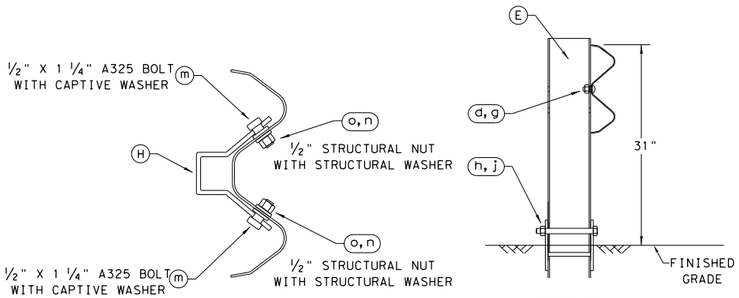
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

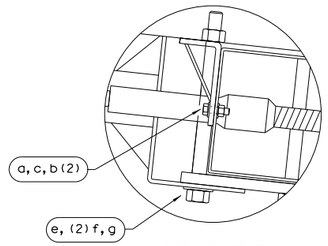
SEE NOTES: ✳

ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL

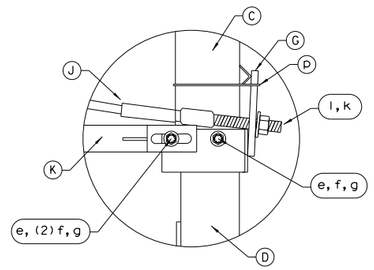


SECTION B-B
ANCHOR BRACKET

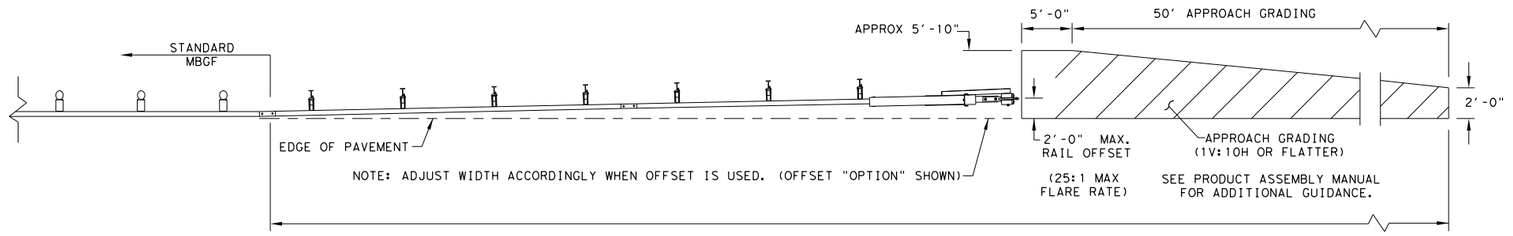
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

TRAFFIC FLOW

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

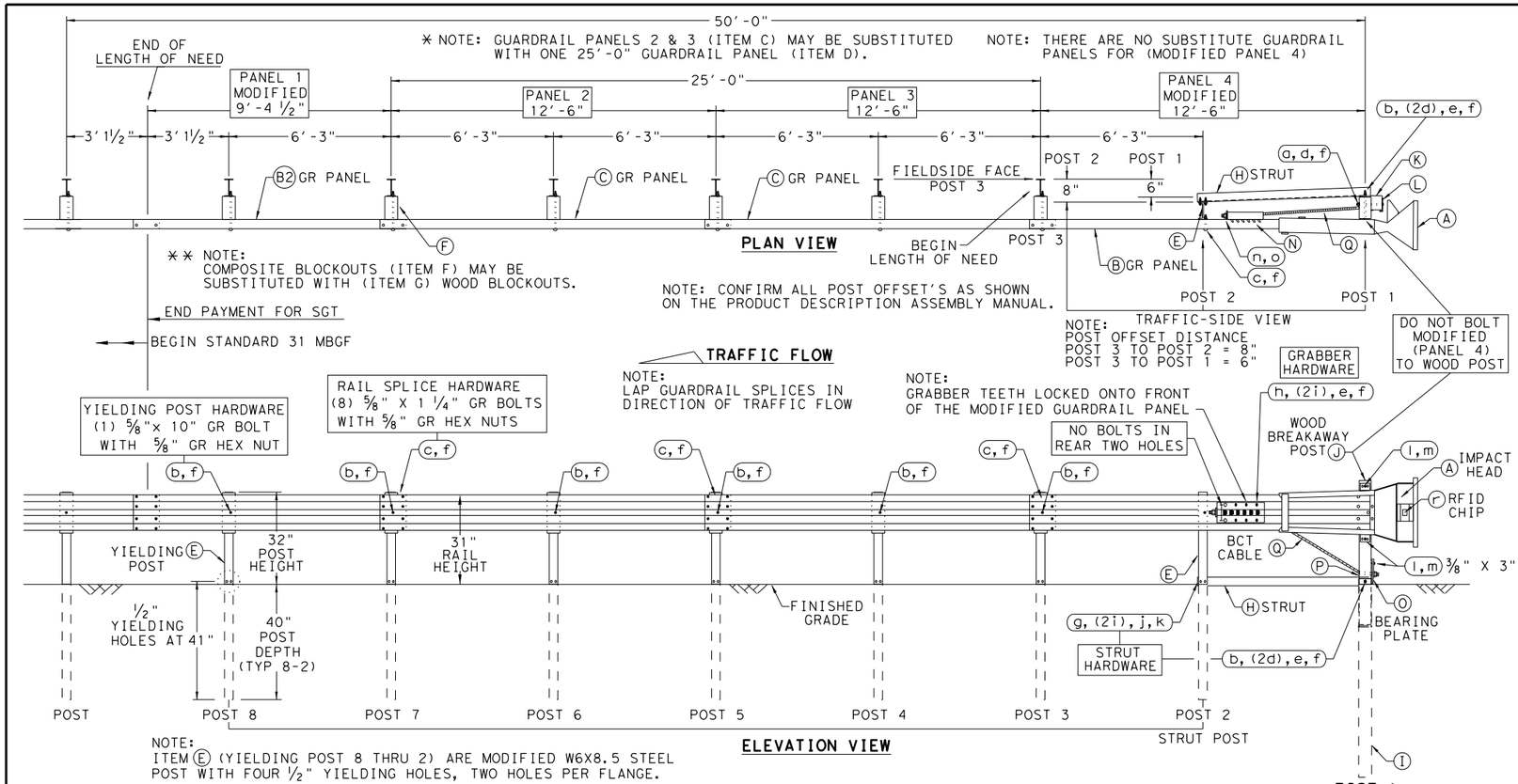
Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0027	01	042	US 90		
	DIST	COUNTY		SHEET NO.		
	YKM	COLORADO		60		

DATE: 3/26/2024
FILE: $FILE$

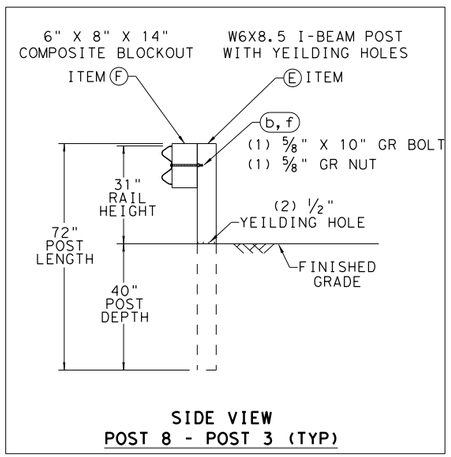


GENERAL NOTES

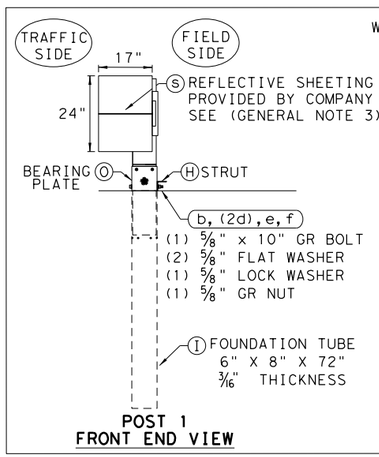
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

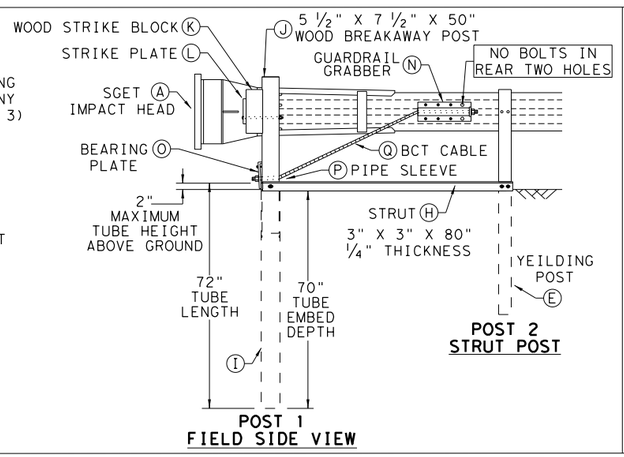
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW
* D E
** G



SIDE VIEW
POST 8 - POST 3 (TYP)

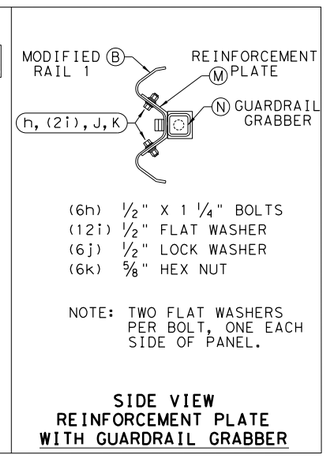


POST 1
FRONT END VIEW

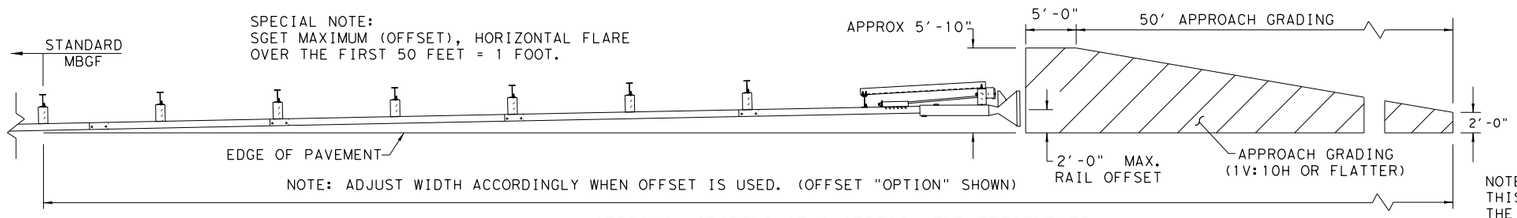


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

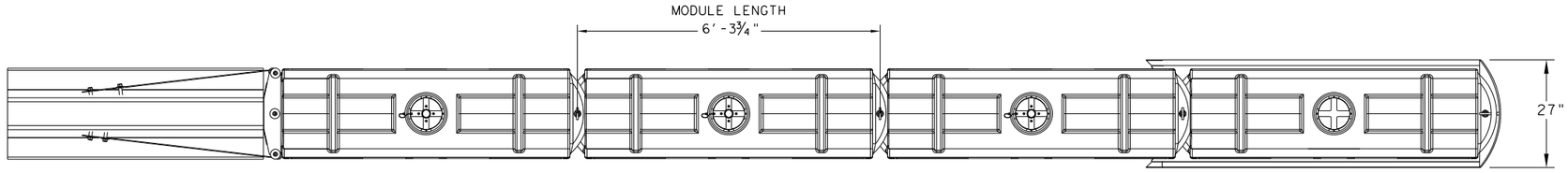
Texas Department of Transportation

Design Division Standard

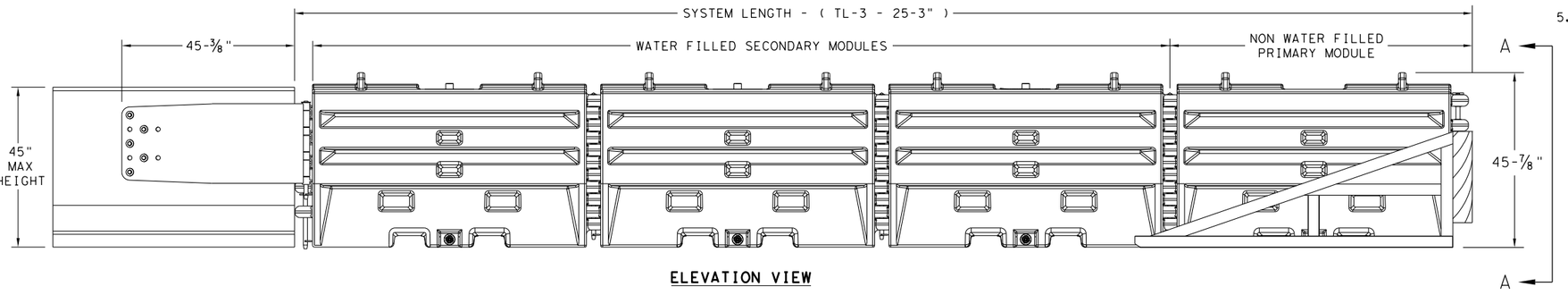
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT		CK: KM	DW: VP		CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0027	01	042		US 90	
	DIST	COUNTY			SHEET NO.	
	YKM	COLORADO			61	

DATE: 3/26/2024
FILE: $FILE$



PLAN VIEW



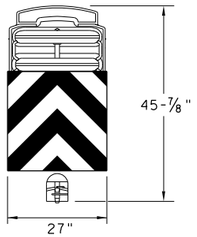
ELEVATION VIEW

GENERAL NOTES

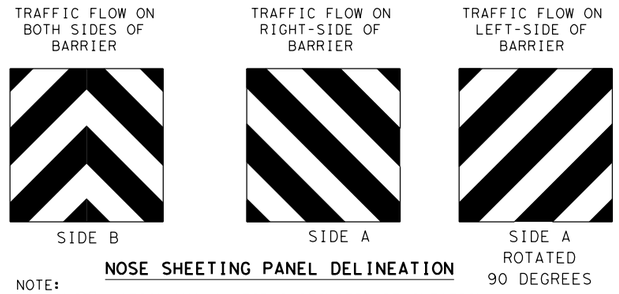
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25′ 3"

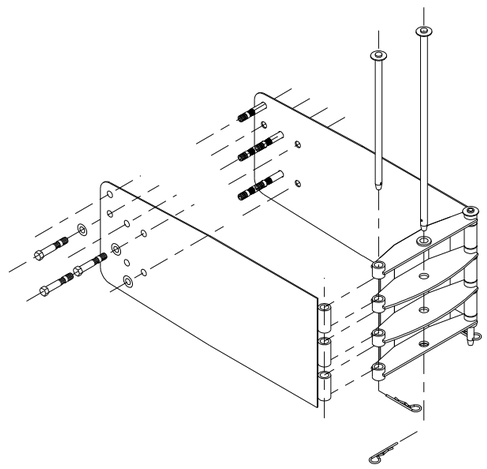


SECTION A-A



NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

BILL OF MATERIAL

PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1

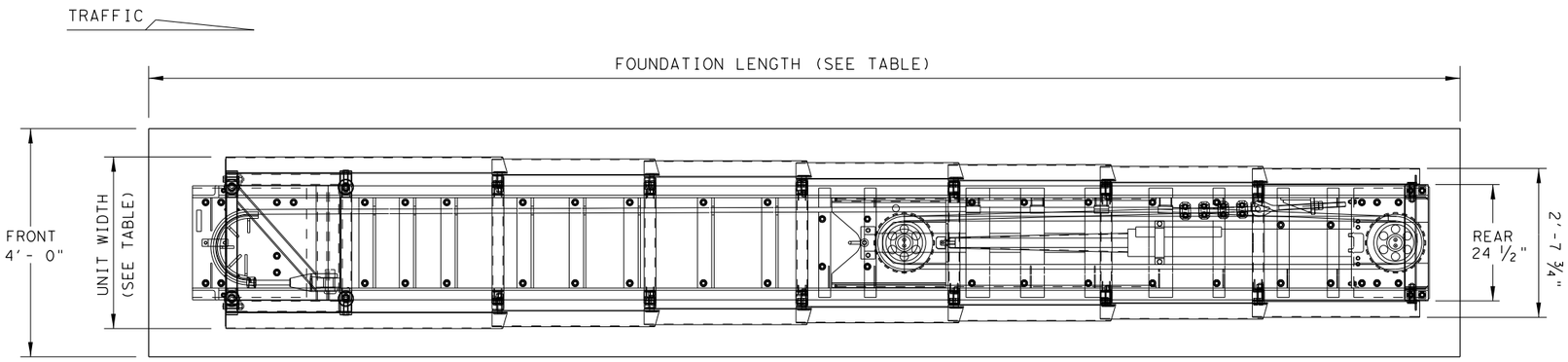
Texas Department of Transportation

Design Division Standard

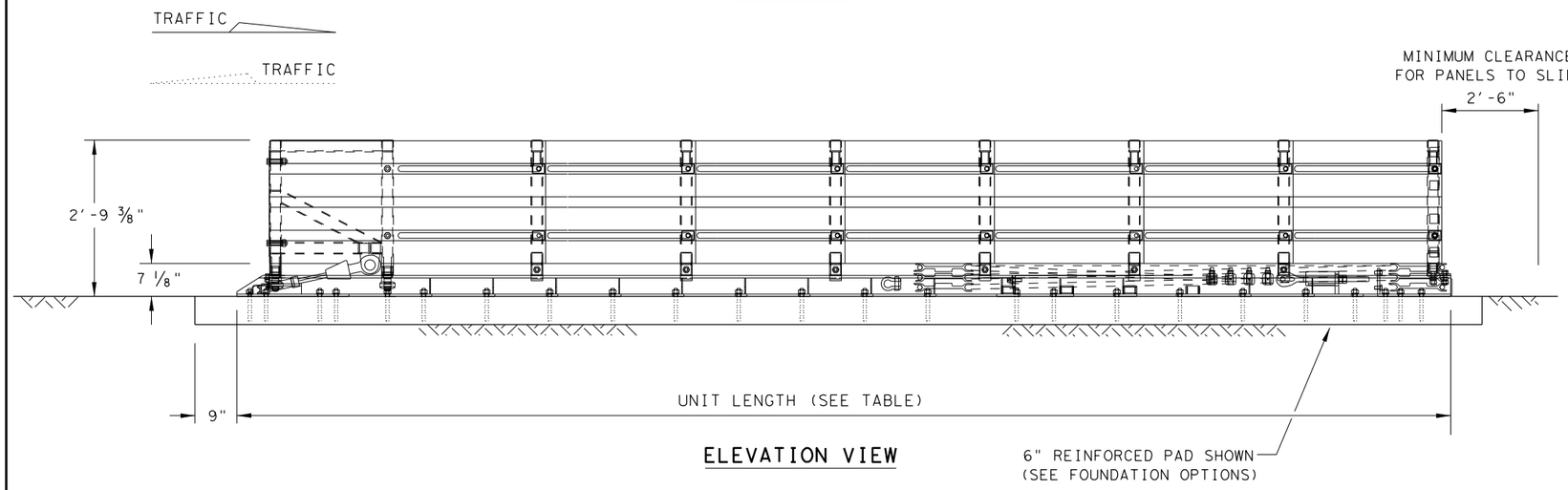
SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		62

DATE: 3/26/2024
FILE: $FILE$



PLAN VIEW



ELEVATION VIEW

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13′-6"	2′-10 ⅝"	15′- 6 ¼"	24"to 36"
SCI100GM	TL-3	21′-6"	3′-1 ½"	23′- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

Texas Department of Transportation

Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

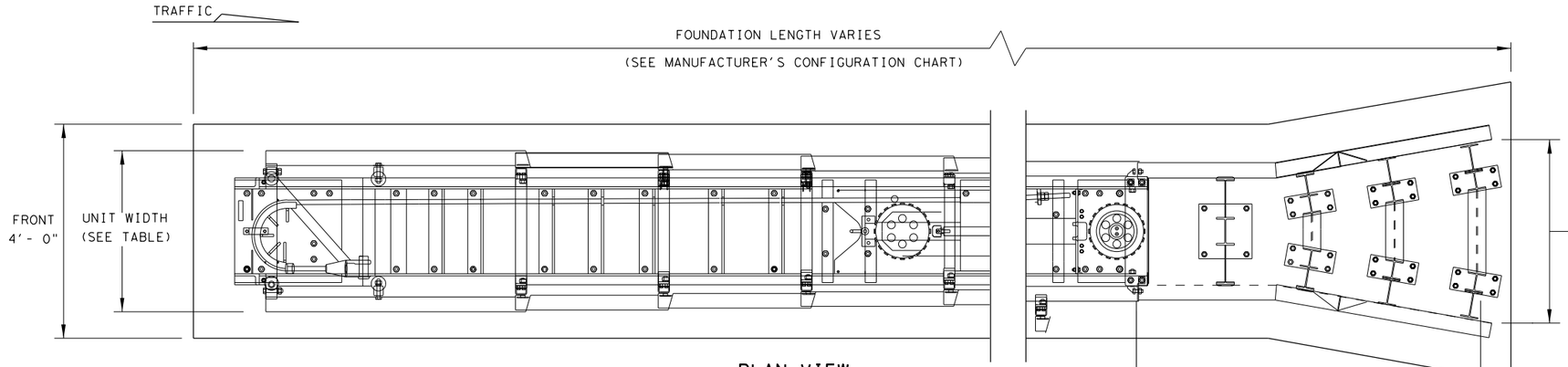
SMTC(N)-16

LOW MAINTENANCE

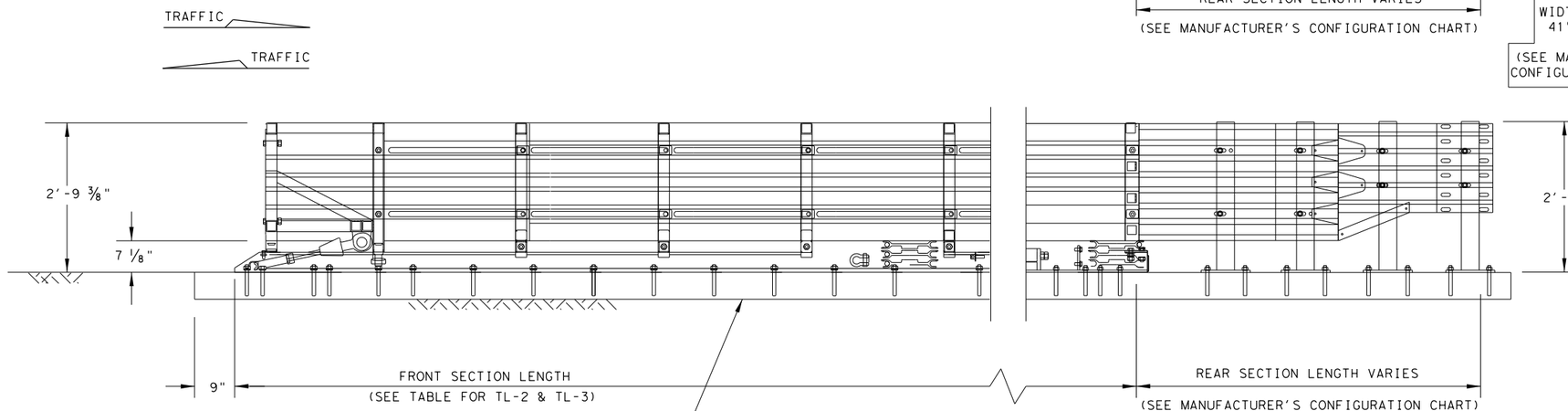
FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		63

DATE: 3/26/2024
FILE: $FILE$

DATE: 3/26/2024
FILE: $FILE$



PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTIONS AND FOUNDATION OPTIONS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR ℄ OF MERGING BARRIERS.

NOTE: FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE: SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

WIDE TRANSITION LENGTHS		
GORE WIDTH	TL-2 OVERALL SYSTEM LENGTH	TL-3 OVERALL SYSTEM LENGTH
41"	20'-1"	28'-1"
48"	21'-10"	29'-10"
55"	23'-5"	31'-5"
60"	24'-7"	32'-7"
68"	26'-6"	34'-6"
69"	26'-8"	34'-8"
81"	29'-7"	37'-7"
88"	31'-2"	39'-2"
94"	32'-7"	40'-7"
100"	34'-1"	42'-1"
107"	35'-8"	43'-8"
112"	36'-11"	44'-11"
120"	38'-10"	46'-10"
126"	40'-2"	48'-2"
133"	41'-11"	49'-11"

FOUNDATION OPTIONS
6" Reinforced Concrete (5 1/2" Anchor Embedment)
8" Unreinforced Concrete (5 1/2" Anchor Embedment)
3" Min. Asphalt over 3" Min. Concrete (16 1/2" Anchor Embed.)
6" Asphalt over 6" Compact Subbase (16 1/2" Anchor Embed.)
8" Minimum Asphalt (16 1/2" Anchor Embedment)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
Concrete Vertical Wall
Concrete Traffic Barriers
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

MODEL (WIDE)	TEST LEVEL	FRONT SECTION LENGTH	UNIT WIDTH	FOUNDATION LENGTH	GORE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 5/8"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"
SCI100GM	TL-3	21'-6"	3'-1 1/2"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

LOW MAINTENANCE

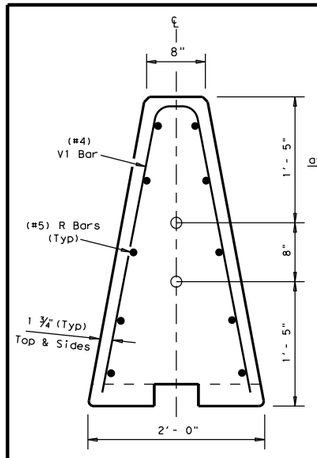
Texas Department of Transportation

Design Division Standard

WORK AREA PROTECTION CORP (SMART-WIDE)

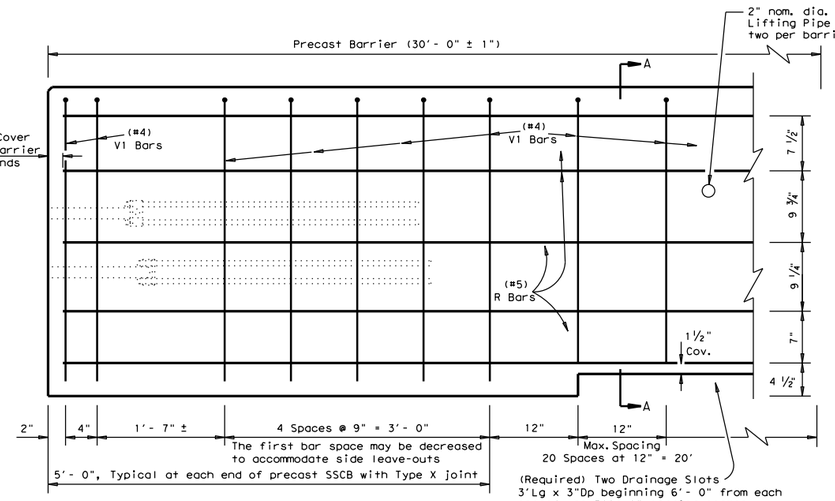
SMTC(W)-16

FILE: smtcw16.dgn	DN: TxDOT	CK: KM	DW: BD/VP	CK: VP
© TxDOT: FEBRUARY 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
REVISED 06, 2013 VP REVISED 05, 2016 VP REVISED 04, 2018 VP	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		64



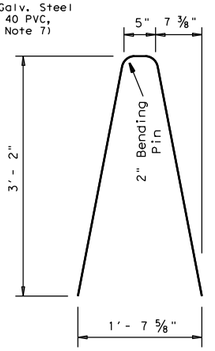
End View
Precast Barrier

Pipe locations for Joint Type X connection



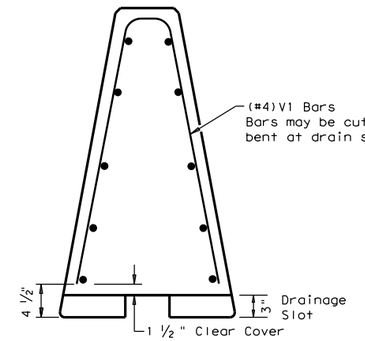
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



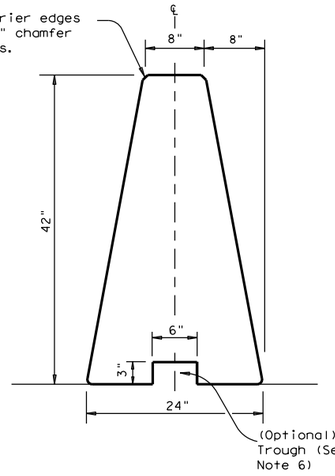
V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



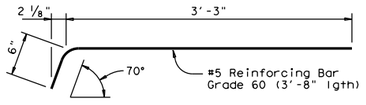
Section A-A
Steel Placement at (Required) Drainage Slots

All precast barrier edges shall have a ¾" chamfer or tooled radius.



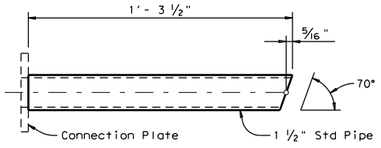
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



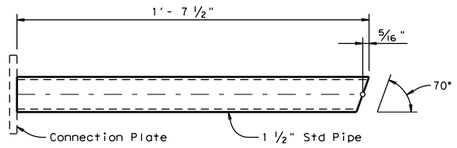
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



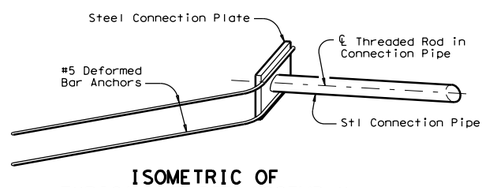
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

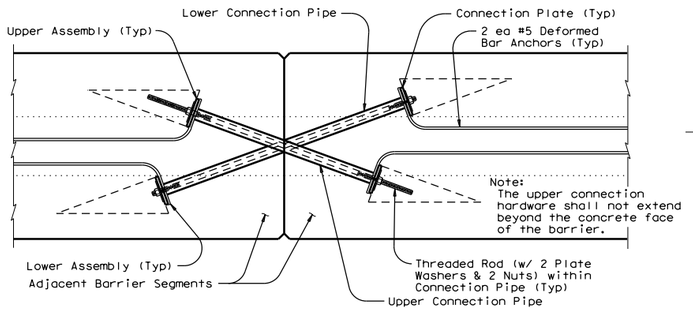


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

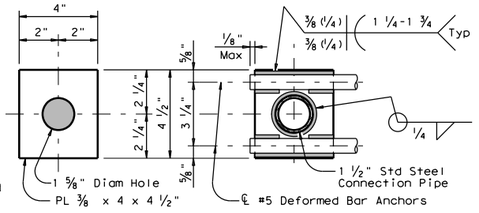
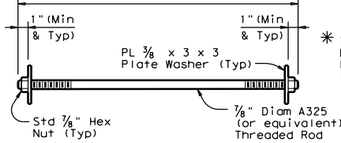


PLATE DIMENSIONS **WELDING DETAILS**

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.

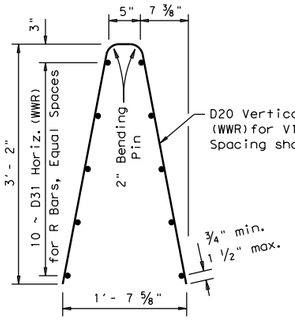


✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

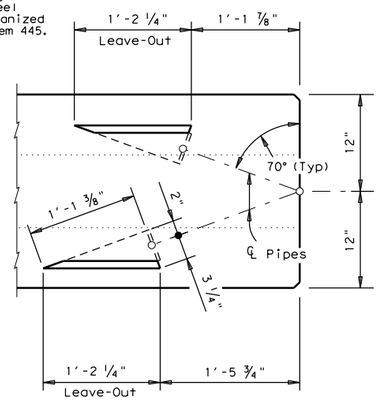
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement (WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

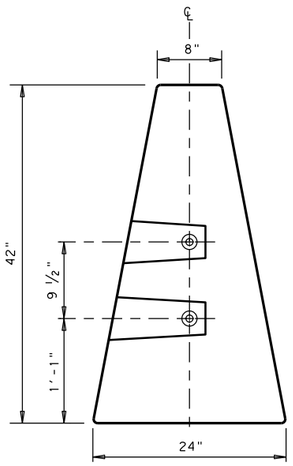
PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

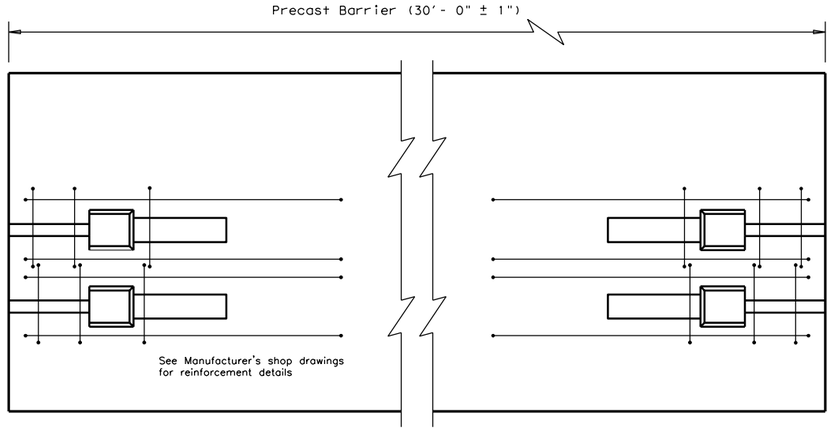
FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		65

DATE: 3/26/2024
FILE: $FILE$

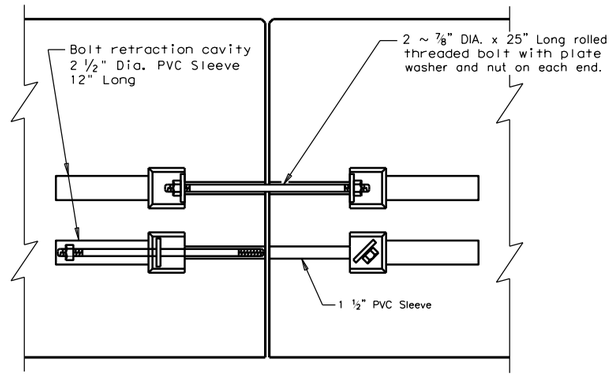
DATE: 3/26/2024
FILE: $FILE$



END VIEW
"QUICK-BOLT" POCKET LOCATIONS

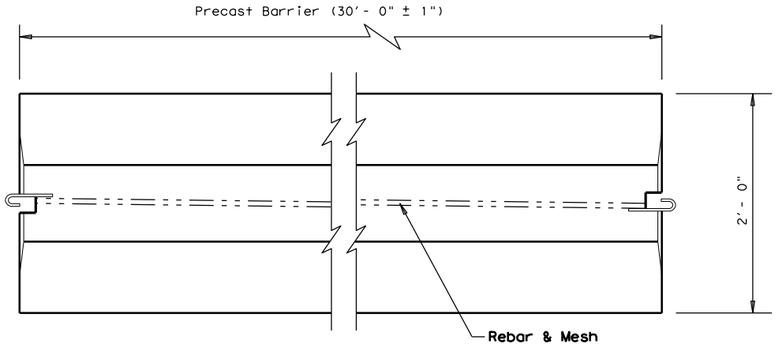


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

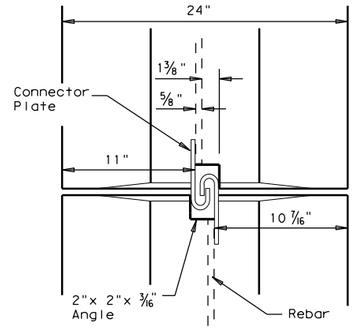


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

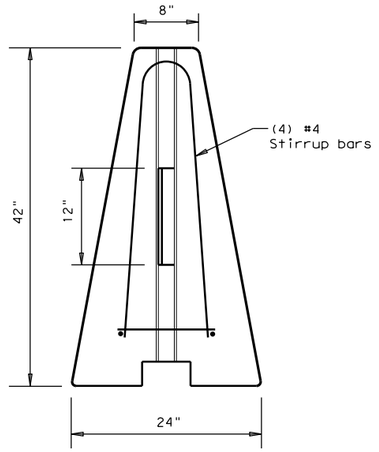
Joint Connection (Type Q)



TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



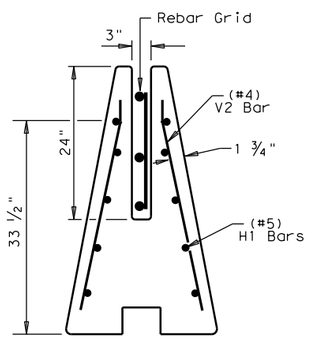
END VIEW

Proprietary Joint Connections (SSCB)

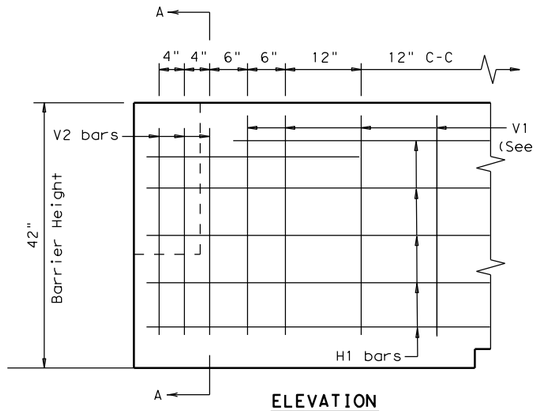
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

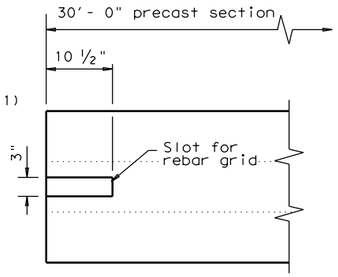
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



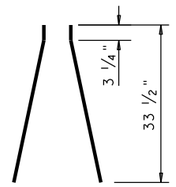
SECTION A-A
Showing (Type R) Rebar Grid



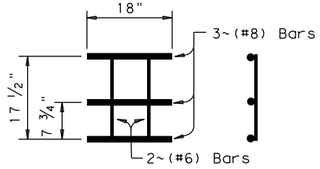
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

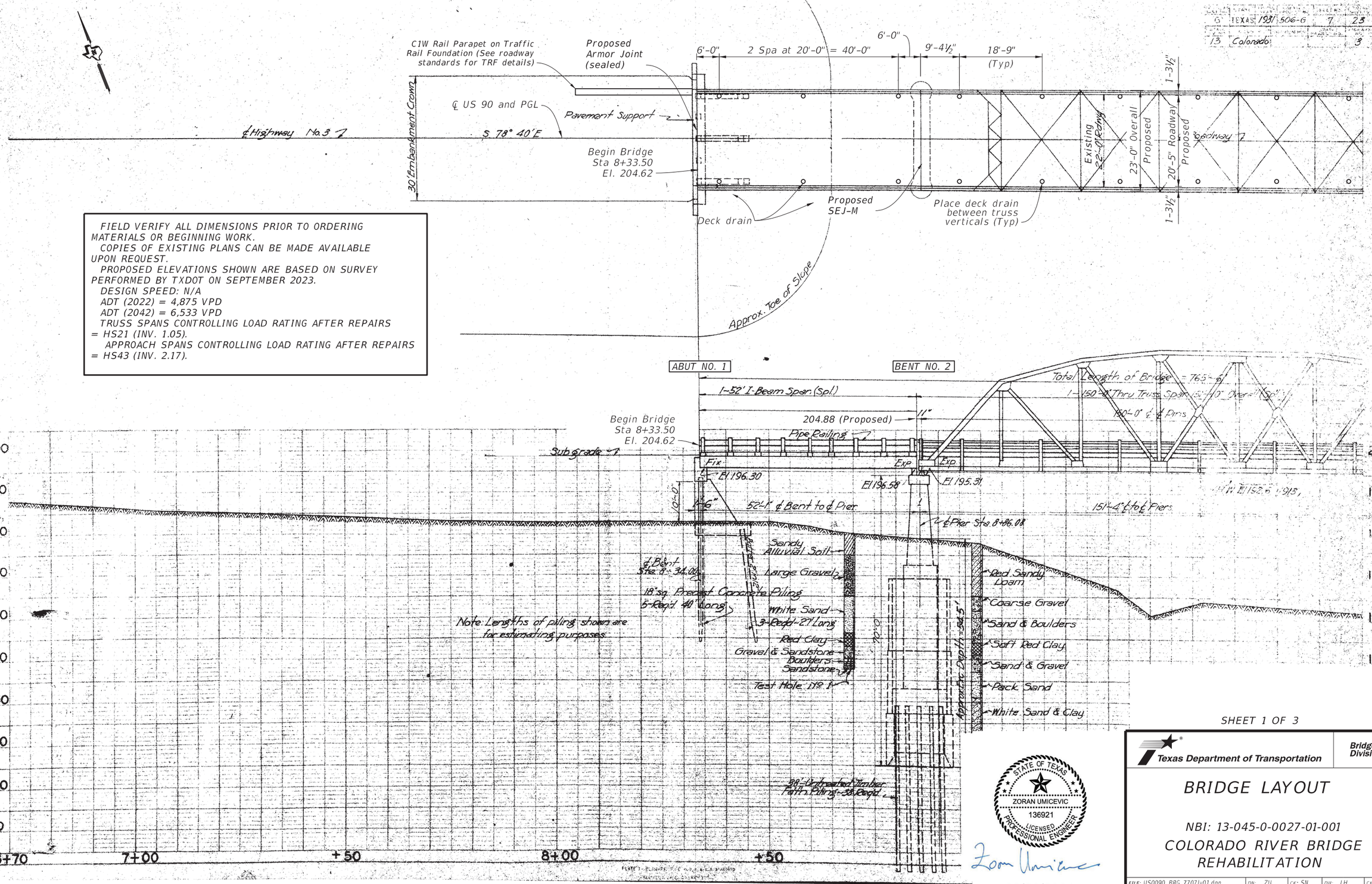
SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		66

5	TEXAS 1931 506-G	7	23
13	Colorado		3



FIELD VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS OR BEGINNING WORK.

COPIES OF EXISTING PLANS CAN BE MADE AVAILABLE UPON REQUEST.

PROPOSED ELEVATIONS SHOWN ARE BASED ON SURVEY PERFORMED BY TXDOT ON SEPTEMBER 2023.

DESIGN SPEED: N/A

ADT (2022) = 4,875 VPD

ADT (2042) = 6,533 VPD

TRUSS SPANS CONTROLLING LOAD RATING AFTER REPAIRS = HS21 (INV. 1.05).

APPROACH SPANS CONTROLLING LOAD RATING AFTER REPAIRS = HS43 (INV. 2.17).

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

Zoran Umicevic

03/26/2024

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division

BRIDGE LAYOUT

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707ly01.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST.	COUNTY		SHEET NO.
	YKM	COLORADO		67

DATE: 1/4/2024 3:51:08 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707ly01.dgn

FED ROAD DIST. NO.	STATE	FISCAL YEAR	FED. AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
6	TEXAS	1951	506-6	8	24
STATE DIV. NO.	COUNTY	JOB NUMBER	STATE PROJECT NO.		NUMBER OF BRIDGES
13	COLORADO				1

18'-9" (Typ) | 9'-4½" | 12'-6" | 25'-0" (Typ) | 12'-6" | 9'-4½" | 18'-9" (Typ)

Proposed SEJ-M

℄ Highway No. 3

S 78°40'E

RIVER

22'-0" Roadway

Proposed SEJ-M

Place deck drain between truss verticals (Typ)

COLORADO

flow

BENT NO. 3

205.53 (Proposed)

Total Length of Bridge — 765'-6"

1-200' Thru Truss Span 201'-10" Overall (T-22-200)

200'-00" c-c Pins

1'-10"

FIX

FIX

EXP.

FIX

BENT NO. 4

205.39 (Proposed)

1-150' Thru Truss Span 151'-10" Overall (Spl.)

150'-00" c-c Pins

1'-10"

El. 195.72

4'-0" Clearance to low steel

H.W. 1926 (1913)

201'-8" c-c Piers

151'-4" c-c Piers

2

℄ Pier Station 10+37.41

70'-0"

3

℄ Pier Station 12+39.08

70'-0"

Approx. Exc. Depth - 29'-6"

Water El. 153.42 (May 2, 1930)

Sand Bar Oct. 3rd 1930?

Loose Sand ?

Loose Sand

Black Mud

Grey Mottled Clay

Yellow Clay

Greyish Blue Joint Clay

Sand Clay - Hard

Grey Brown Clay

Clay & Sandstone

Joint Clay

Sand

Sand & Gravel

Brown & Gray Clay

Gray Clay & Gravel

38' Untreated Timber Foundation Piling, 62 Required

Special Note: Profile of Stream Channel Made from Survey 1930. No extra compensation for falsework or other incidental construction will be allowed for shifts in channel or changes in stream profile due to erosion.

Note - Lengths of Piling shown are for Estimating Purposes Only.

10+00

11+00

12+00

200

190

180

170

160

150

140

130

120

110

SHEET 2 OF 3

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707ly01.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		68

DATE: 1/4/2024 3:51:08 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707ly01.dgn

FED. ROAD DIST. NO.	STATE	FISCAL YEAR	FEDERAL AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
6	TEXAS	93	506-6	9	23
STATE DIST. NO.	COUNTY		ROW NUMBER	STATE PROJECT NO.	HIGHWAY NO.
13	COLORADO				3

18'-9" (Typ)

9'-4½" | 6'-0" | 2 Spa at 20'-0" = 40'-0" | 6'-0" | 6'-0" | 2 Spa at 20'-0" = 40'-0" | 6'-0" | 6'-0" | 2 Spa at 20'-0" = 40'-0" | 6'-0" | 6'-0" | 2 Spa at 20'-0" = 40'-0" | 6'-0"

C1W Rail Parapet on Traffic Rail Foundation (See roadway standards for TRF details)

Proposed SEJ-M

S 78°40'E

℄ Highway No. 3 2

Proposed Armor Joint (sealed)

2¾" Premolded Exp. Jt.

32'-0" Roadway

30'-0" Embankment Cone

Pavement Support

End of Bridge Station 15+99.00 El. 202.81

Place deck drain between truss verticals (Typ)

Direction of Flow

Approx. Toe of Slope

Proposed Armor Joint (sealed)

BENT NO. 5 | BENT NO. 6 | BENT NO. 7 | BENT NO. 8 | ABUT NO. 9

Grade El. 204.80 (Proposed) | Grade El. 204.32 (Proposed) | Grade El. 203.79 (Proposed) | Grade El. 203.25 (Proposed) | Grade El. 202.81 (Proposed)

Total Length of Bridge = 765'6"

4-52'I-Beam Spans (Spl.)

52'-0" | 52'-0" | 52'-0" | 52'-0"

End of Bridge Station 15+99.0

Subgrade

3 Thru Truss Spans (5) 150'0" Overall = 1 (Spl.)

150'-0" C to C Pins

151'-4" C to C Piers

HW El. 192.6 (1913)

Exp. | Exp. | Fix | Exp. | Fix | Exp. | Fix | Exp. | Fix

El. 196.58 | El. 195.31 | El. 196.07 | El. 195.57 | El. 195.07 | El. 194.56

52'-7" ℄ Pier – ℄ Bent | 52'-0" C to C Bents | 52'-0" C to C Bents | 51'-6" C to C Bents

℄ Bent Station 14+43.00

℄ Pier Station 13+90.41

℄ Bent Sta. 14+95.00

℄ Bent Sta. 15+47.0

℄ Bent Sta. 15+98.5

Alluvial Sandy Loam

Alluvial Dark Sandy Loam

White Sand

Red Sandy Clay

White Sand

Red Clay

White Sand

Fine Grey Sand

Sand & Gravel

Mud & Gravel

18"Sq. Precast Concrete Piling 60' Long 7 per Bent

Approx. Ex. Depth 44.5'

70'-0"

38 Untreated Timber foundation Piling 38 Required

Note: Lengths of Piling Shown are for Estimate Purposes only.

Sand

Sand & Gravel

Black Mud & Gravel

Sand & Gravel

Bluish Grey Clay

Sand Clay

Gray Clay

Gray Clay & Gravel

Gray Clay Mottled Clay

200 | 190 | 180 | 170 | 160 | 150 | 140 | 130 | 120 | 110

13+10 | +50 | 14+00 | +50 | 15+00

8"Sq. Precast C...

SHEET 3 OF 3

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

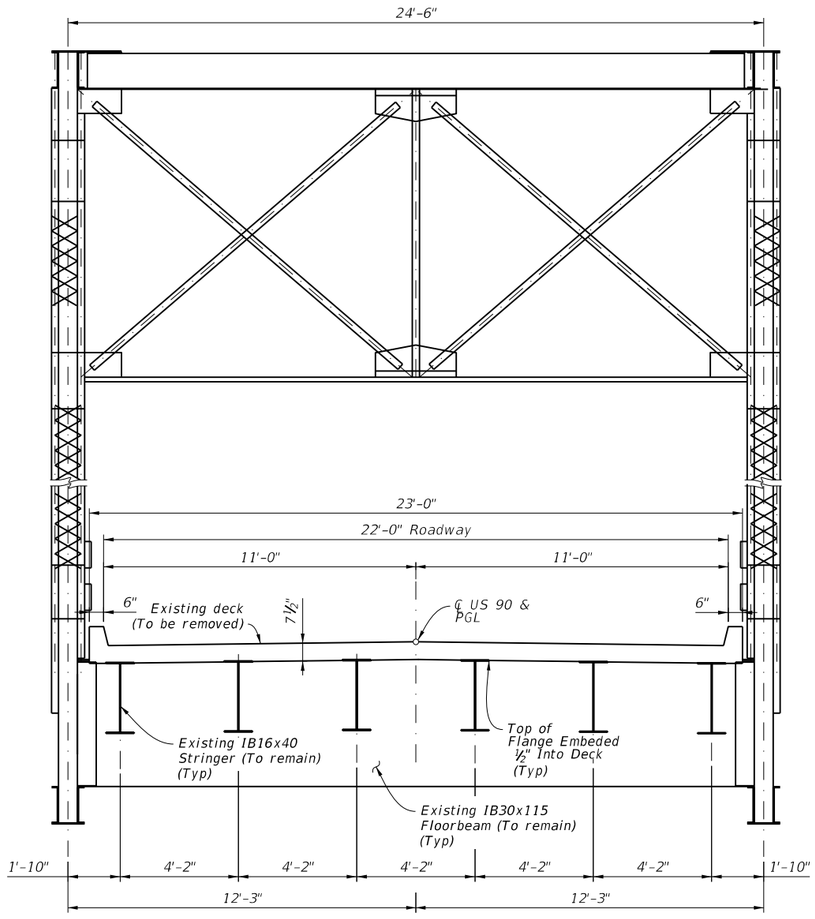
BRIDGE LAYOUT

NBI: 13-045-0-0027-01-001

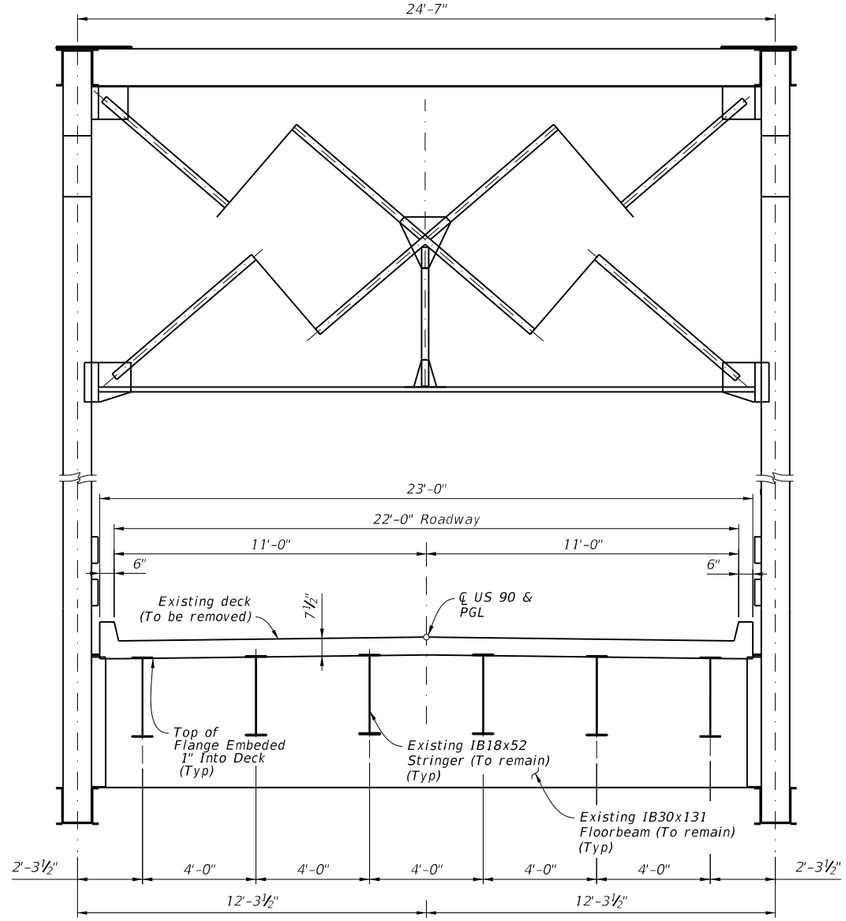
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707ly01.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		69

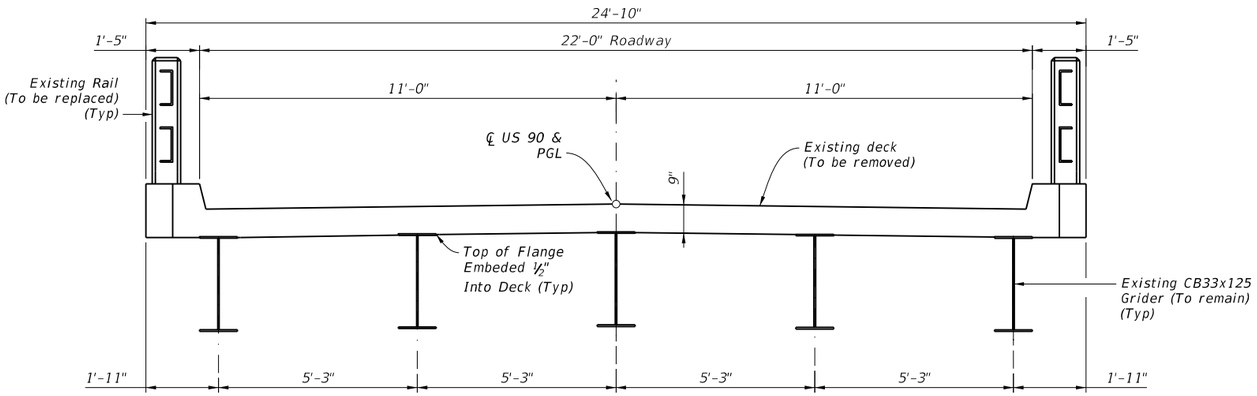
DATE: 1/4/2024 3:51:08 PM
FILE: pw:\\txdot.projectwiseonline.com\TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7 - Bridge\US0090_BRG_7707ly01.dgn



EXISTING 150' TRUSS SPAN SECTION



EXISTING 200' TRUSS SPAN SECTION



EXISTING 52' APPROACH SPAN SECTION

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

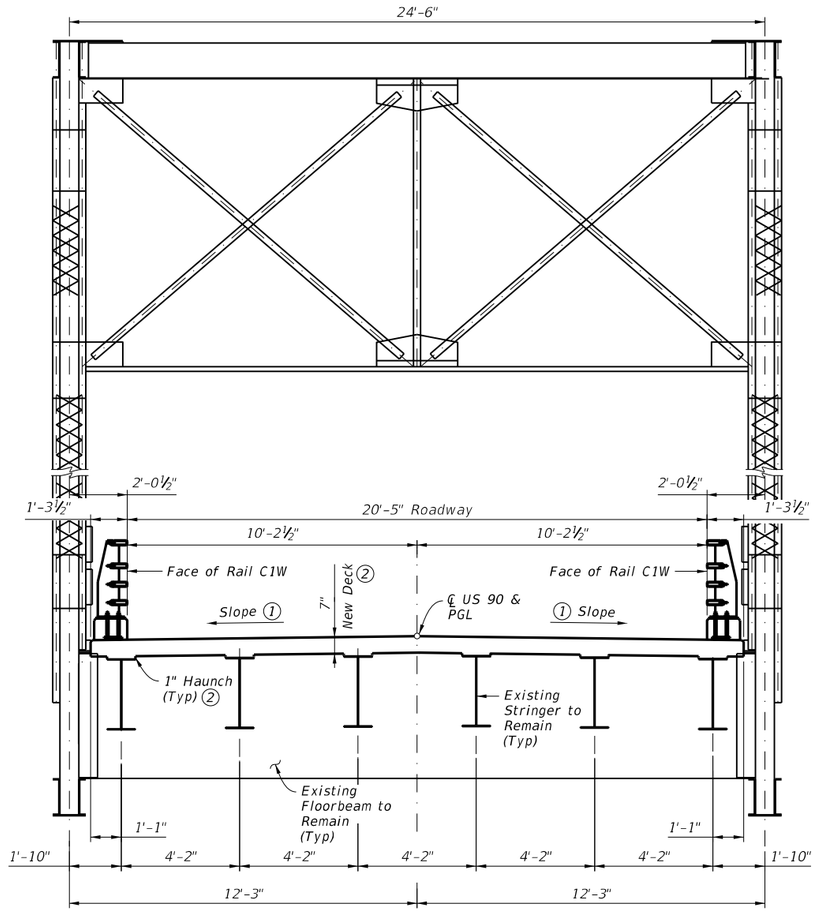
TYPICAL SECTION (EXISTING)

NBI: 13-045-0-0027-01-001

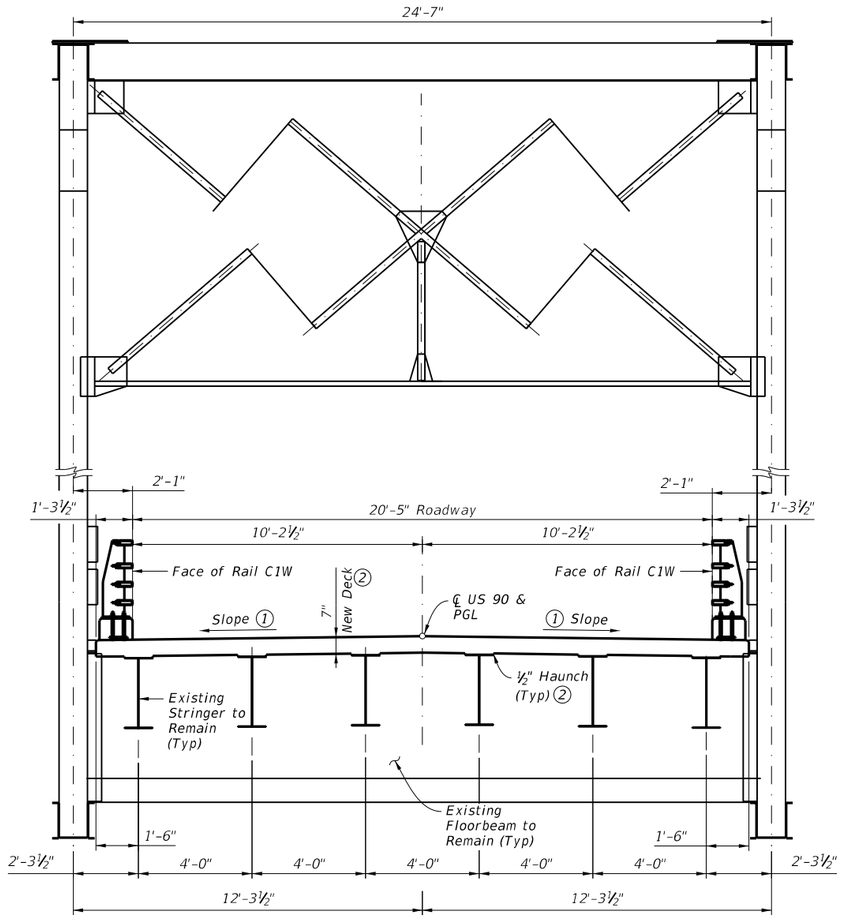
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707Iy02.dgn		DN: ZU	CK: SN	DW: LH	CK: ZU		
©TxDOT FEBRUARY 2024	CONT.	SECT.	JOB	HIGHWAY			
REVISIONS	0027	01	042	US 90			
	DIST.	COUNTY		SHEET NO.			
	YKM	COLORADO		70			

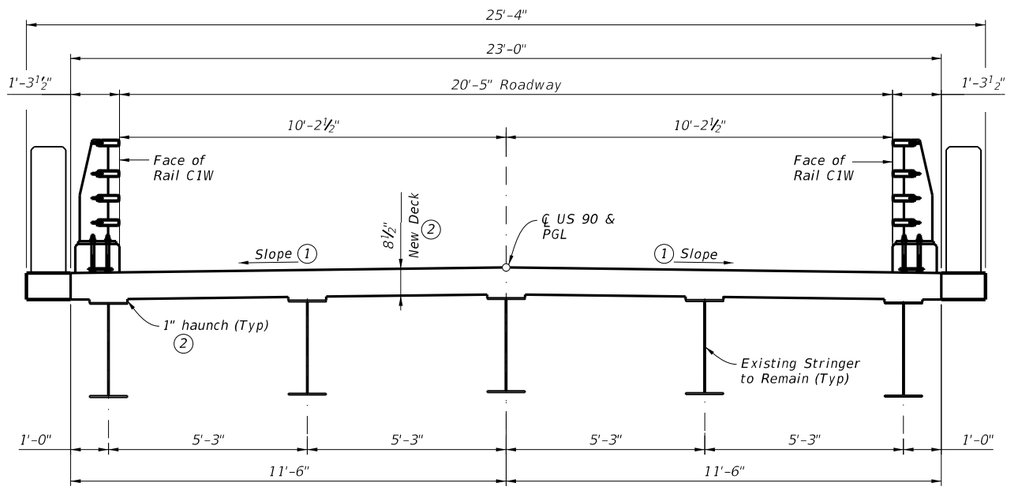
DATE: 12/19/2023 10:33:11 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT\Documents\13 - YKM\Design Projects\0027010421\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707Iy02.dgn



PROPOSED 150' TRUSS SPAN SECTION



PROPOSED 200' TRUSS SPAN SECTION



PROPOSED 52' APPROACH SPAN SECTION

(Showing location of existing rail relocation, other section similar)

(1) Slope to match approach and depart roadway slope.

(2) Contractor must maintain new deck and haunch thickness. (Top flange thickness not included in haunch thickness)

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

TYPICAL SECTION (PROPOSED)

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707ly03.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		71

DATE: 12/29/2023 3:23:34 PM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707ly03.dgn

SUMMARY OF ESTIMATED QUANTITIES

BID CODE	0422 6001	0429 6007	0442 6008	0442 6009	0442 6010	0442 6023	0446 6029	0446 6030	0446 6031	0450 6029	0454 6004	0454 6018	0481 6011	0496 6058
BID ITEM DESCRIPTION / BRIDGE ELEMENT	REINF CONC SLAB	CONC STR REPAIR (VERTICAL & OVERHEAD)	STR STEEL (MISCELLANEOUS BRIDGE)	STR STEEL (DIAPHRAGM & STIFFENER)	STR STEEL (SHEAR CONNECTOR)	STR STEEL (MISC NON-BRIDGE TYPE 1) (1)	CLEAN AND PAINT EXIST STR (REF NO.1)	CLEAN AND PAINT EXIST STR (REF NO.2)	CLEAN AND PAINT EXIST STR (REF NO.3)	RAIL (TY C1W)	ARMOR JOINT (SEALED)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	PIPE (PVC) (SCH 40) (4 IN)	REMOV STR (BRIDGE SLAB)
	SF	SF	LB	LB	LB	EA	LS	LS	LS	LF	LF	LF	LF	LF
2 - ABUTMENTS		50.0									46			
7 - INTERIOR BENTS		150.0		8415							23	92		
5 - 52' APPROACH SPAN	6231.0				4704.0	1	1			724.1			131	260.0
2 - 150' TRUSS SPAN	6984.3		50.0		8085.5			1		607.3			140	303.7
1 - 200' TRUSS SPAN	4642.2		50.0		6571.3				1	403.7			70	201.8
OVERALL TOTALS:	17858	200.0	100	8415	19361	1	1	1	1	1735.1	69	92	341	765.5

BID CODE	0778 6024	0778 6076	0784 6004	0784 6005	0784 6006	0784 6011	0784 6012	0784 6013	0784 6021	0784 6022	0784 6028	0784 6032	0784 6034	0784 6038
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CONCRETE POST REPLACEMENT	CONCRETE RAIL REPLACEMENT (IN-KIND)	REP STL BRIDGE MEMBER (TRUSS VERTICAL)	REP STL BRIDGE MEMBER (TRUSS DIAGONAL)	REP STL BRIDGE MEMBER(TRUSS SWAY BRACE)	REP STL BRIDGE MEMBER (BOTTOM CHORD)	REP STL BRIDGE MEMBER (TOP CHORD)	REP STL BRIDGE MEMBER (ENDPOST)	REP STL BRDG MEMB (TRUSS PORTAL BRACE)	REP STL BRIDGE MEMBER (FLOORBEAM)	REP STL BRIDGE MEMBER (STRINGER)	REP STL BRIDGE MEMBER (GUSSET CON)	REP STL BRIDGE MEMBER(STRAIGHTEN MEMB)	REP STL BRIDGE MEMBER(REPL RIVET/BOLT)
	EA	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
2 - ABUTMENTS														
7 - INTERIOR BENTS														
5 - 52' APPROACH SPAN	90	520												
2 - 150' TRUSS SPAN			2	1	4	4		8	2	6	2	13	16	8000
1 - 200' TRUSS SPAN				2	3	6	1	4	1	3	1	5		5500
OVERALL TOTALS:	90	520	2	3	7	10	1	12	3	9	3	18	16	13500

SUMMARY OF PAINTING QUANTITIES

SPAN DESCRIPTION	CLEAN & PAINT EXIST STR	PAINT SYSTEM	LOCATION DESCRIPTION	Appox. Paint QTY
				SF
5-52.00' I-BEAM SPANS	Ref No. 1	IIIA	APPROACH SPANS	13,300
2-150.00' TRUSS SPAN	Ref No. 2	IIIA	TRUSS	45,600
1-200.00' TRUSS SPAN	Ref No. 3	IIIA	TRUSS	33,400
Total				92,300

Quantities are approximate and are for Contractor's information only.
Paint quantities include existing traffic rail on truss spans.

(1) Reconnect detached conduit support (Span 2 South Truss).

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

ESTIMATED QUANTITIES

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707eq01.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		72

DATE: 1/30/2024 7:02:41 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707eq01.dgn

SUGGESTED CONSTRUCTION SEQUENCE: (1)

REPAIR PHASE I

1. Span 2, Span 3, and Span 4, Blast clean truss members above the deck slab prior to repair.
2. Complete all repairs to verticals, diagonals, end portals, interior sway frames, end posts, top and bottom chords and rails for Span 2, Span 3 and Span 4. These repairs include the following: Repair 1–7, Repair 10–12.
3. Remove existing deck slab from Span 2, Span 3, and Span 4.
4. For Span 2, Span 3, and Span 4, Blast clean the lower truss members after deck removal.
5. Perform repairs 8 and 9.
6. Perform substructure repairs. Substructure repairs may be performed concurrently with other repairs.

REPAIR PHASE II

1. Install shear studs on stringers and floor beams.
2. Clean and paint truss members on Span 2, Span 3 and Span 4.
3. Cast the new deck slab and install deck joints for Span 2, Span 3, and Span 4.
4. Install new C1W rails on Span 2, and Span 3, and Span 4.

REPAIR PHASE III

1. Remove existing deck slab, concrete diaphragms and rail on approach spans. (2)
2. Install steel diaphragms at abut 1 & 9 and bents 5–8.
3. Clean and paint steel floor system members (stringers and diaphragms).
4. Cast new deck slab and install new deck joints.
5. Install new C1W rails on approach spans.

(1) Contractor may propose alternate construction sequence to Engineer of Record for review and approval.

(2) Removal of existing concrete diaphragms and rail to be paid under slab removal item 0496 6058.

TxDOT personnel will perform an additional truss floor system inspection after the deck has been removed, but before painting and deck replacement has begun, to identify any additional repairs to be performed.
Coordinate with TxDOT Bridge Division at least two weeks in advance for scheduling.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

CONSTRUCTION NOTES

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi01.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		73

DATE: 12/19/2023 1:43:04 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi01.dgn

BENT 7 CAP AT WEST SIDE

(Repair concrete spalling – approximate area = 15 SF)

BENT 7 CAP AT EAST SIDE

(Repair concrete spalling – approximate area = 5 SF)

GENERAL NOTES:

Provide Type C Concrete Repair Material conforming to DMS-4655.

Repair intermediate spalls in accordance with TxDOT's "CONCRETE REPAIR MANUAL", Chapter 3, Section 2, "Intermediate Spall Repair".

Notify the Engineer of Record of any damage, including impact damage and section loss, not addressed in the plans.

Conduct any additional repairs in accordance with TxDOT's "CONCRETE REPAIR MANUAL".

Payment for intermediate spall repair conducted in accordance with Item 429-6007, "CONCRETE STRUCTURE REPAIR".

Clean the existing exposed faces of abutments, bents, and bearing per SS7212. Remove all extraneous material from bridge abutments/bents and wash bridge elements.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

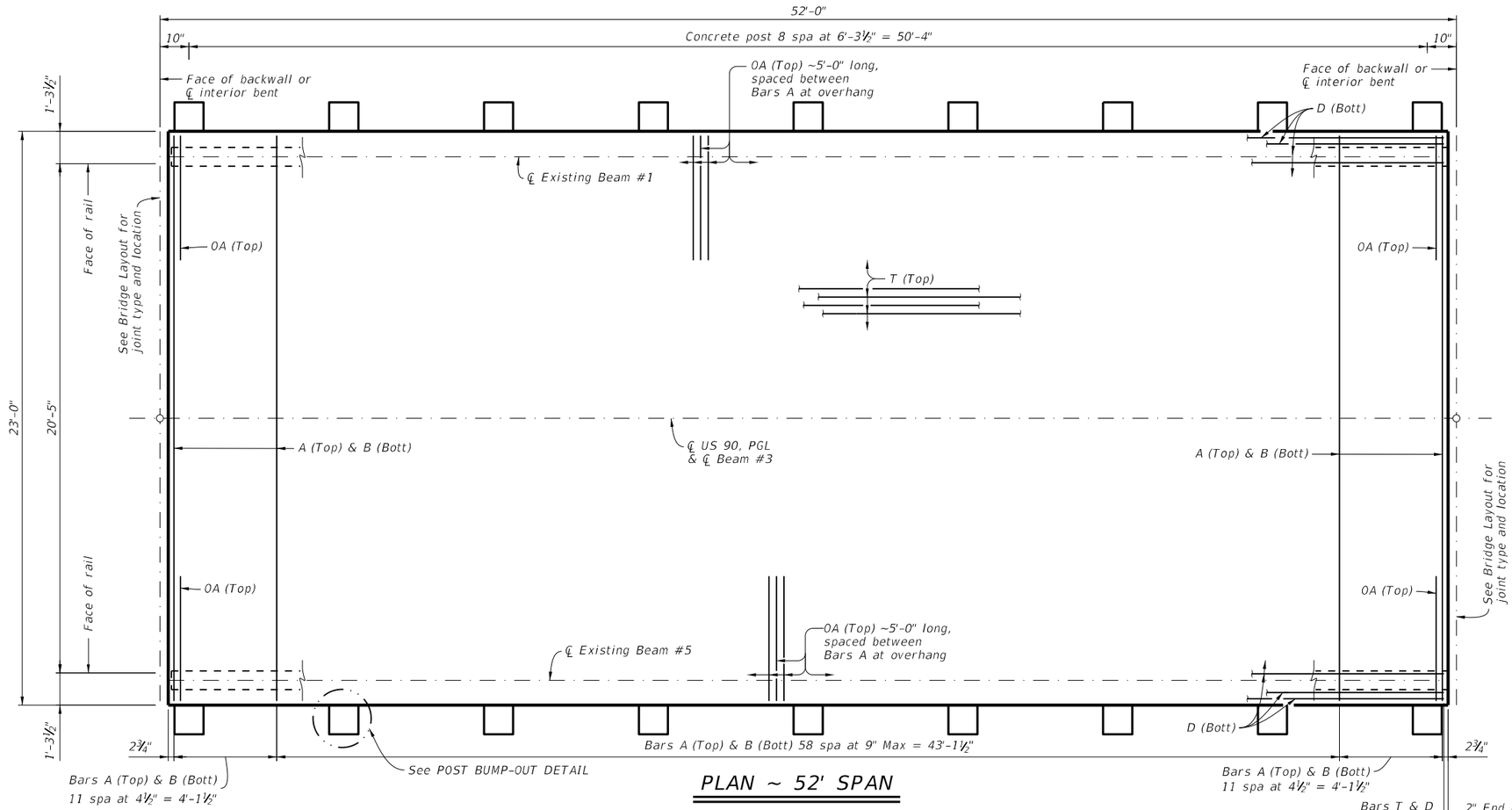
SUBSTRUCTURE REPAIRS

NBI: 13-045-0-0027-01-001

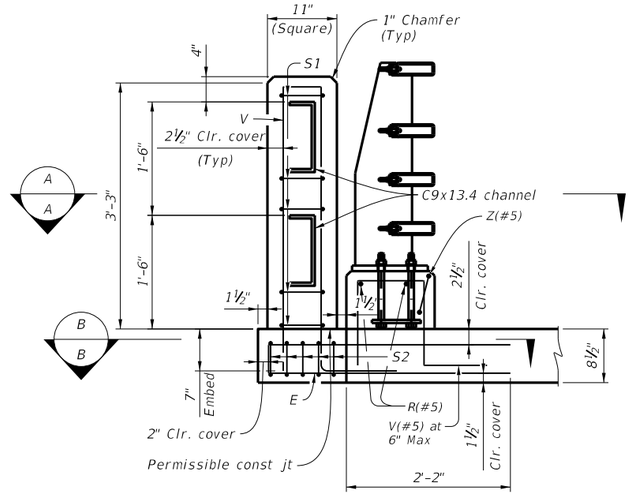
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi02.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		74

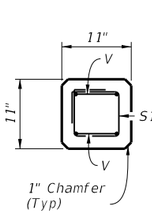
DATE: 1/31/2024 3:19:51 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi02.dgn



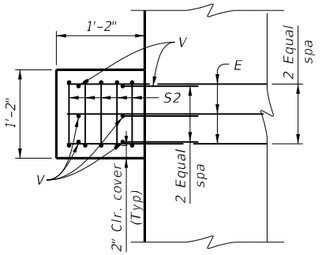
PLAN ~ 52' SPAN



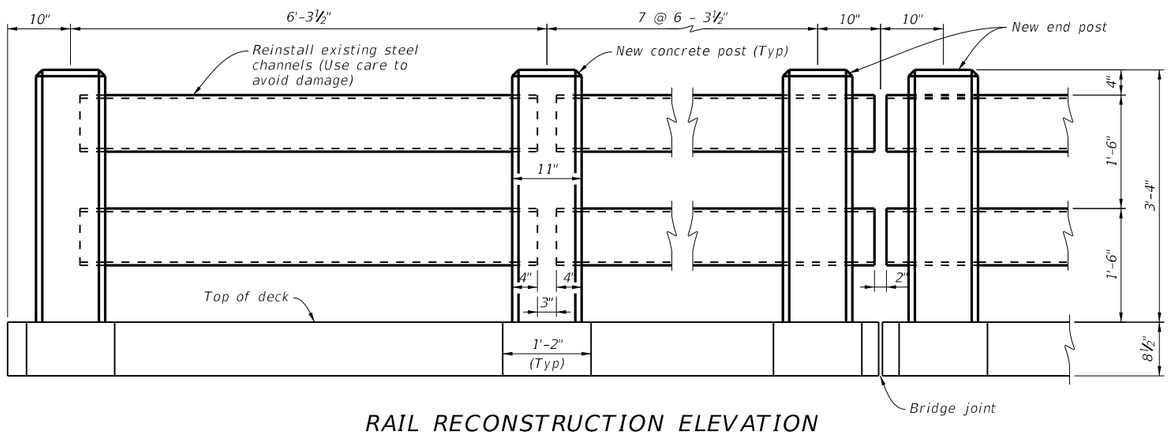
POST BUMP-OUT DETAIL



SECTION A-A

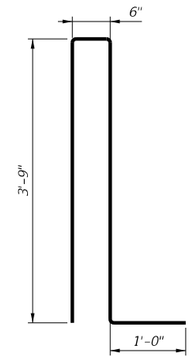


SECTION B-B

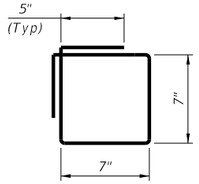


RAIL RECONSTRUCTION ELEVATION

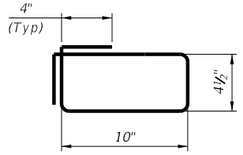
Field verify and match existing dimensions



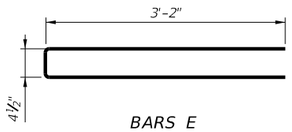
BARS V



BARS S1



BARS S2



BARS E

SHEET 1 OF 3

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

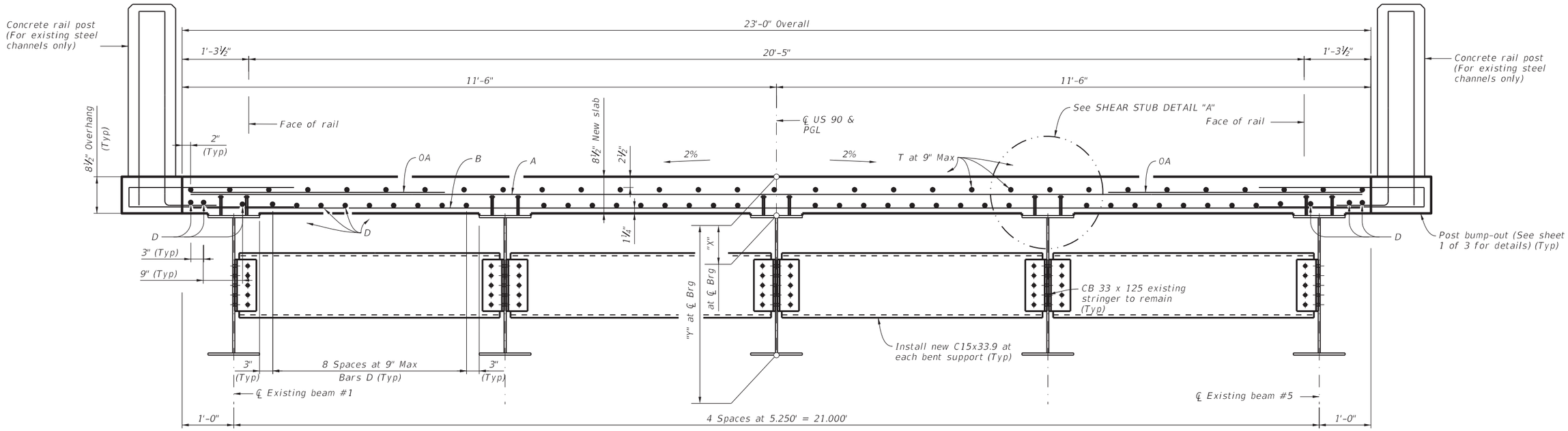
APPROACH SPAN REPAIRS

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

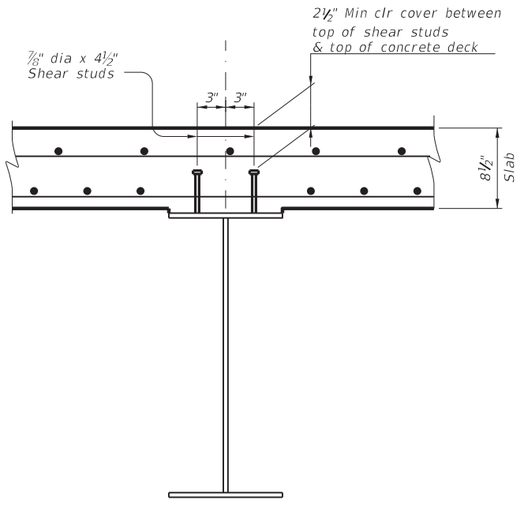
FILE: US0090_BRG_7707mi03.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		75

DATE: 2/16/2024 11:47:03 AM
FILE: pw:\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010042\4 - Design\Plan Set\7 - Bridge\US0090_BRG_7707mi01.dgn

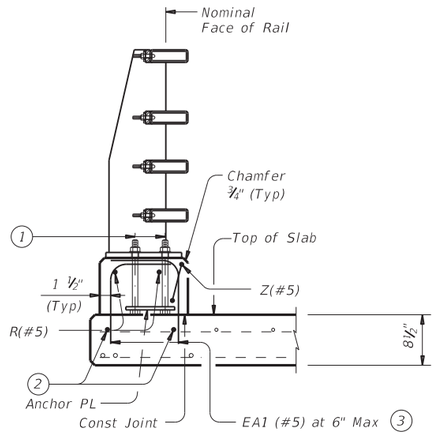


52' APPROACH SPAN TYPICAL SECTION

TABLE OF SECTION DEPTHS			
Span No.	Girder No.	"X" at ℄ Brg.	"Y" at ℄ Brg.
1, 5-8	1-5	9 ½"	3' - 6 5/8"



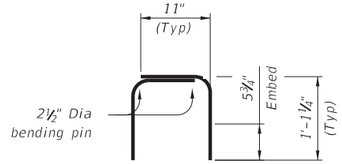
SHEAR STUD DETAIL "A"



OPTIONAL RAIL ANCHORAGE DETAIL ON BRIDGE SLAB

(At the contractor's option and at no additional cost replace bar V shown on C1W standard with bars EA1)

1. ℄ 7#8" Dia Anchor Bolts. See "Anchor Bolt Assembly Details" in C1W standards.
2. Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
3. Use drill equipped with depth gauge stop device to keep from drilling through bottom of slab. If hole extends through to bottom of slab, plug bottom of hole prior to placing adhesive anchorage system. Do not drill substutute hole next to drill through hole. Embed EA1(#5) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5¾". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".



BARS EA1 (#5)

Showing one complete bar.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/26/2024

SHEET 2 OF 3

Texas Department of Transportation — Bridge Division

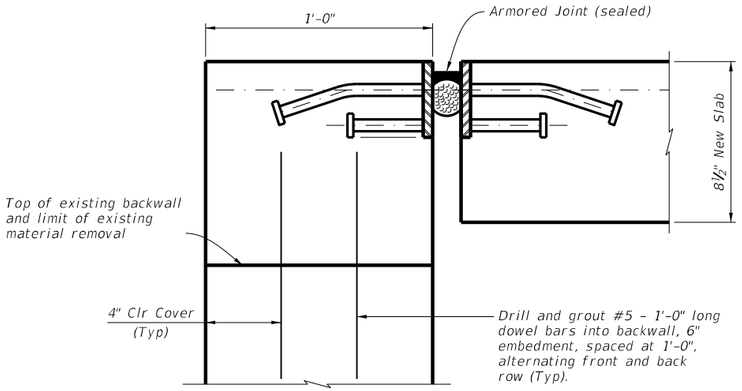
APPROACH SPAN REPAIRS

NBI: 13-045-0-0027-01-001

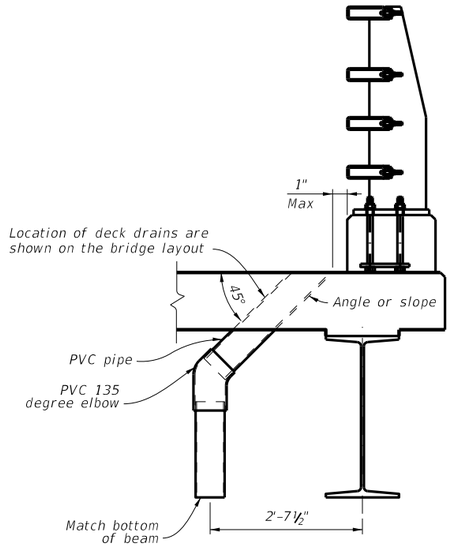
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi03.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		76

DATE: 2/16/2024 11:47:03 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi01.dgn



ARMORED JOINT (SEALED) DETAIL AT ABUTMENT



DECK DRAIN DETAILS

Roughen outside of PVC to ensure bond with cast-in-place concrete.

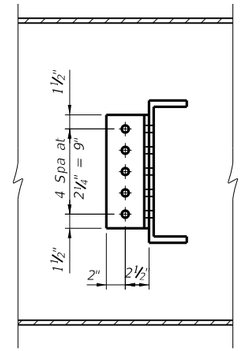
BAR TABLE	
BAR	SIZE
A	#5
B	#5
D	#4
E	#6
OA	#5
S1	#4
S2	#4
T	#4
V	#6

TABLE OF ESTIMATED QUANTITIES (5)

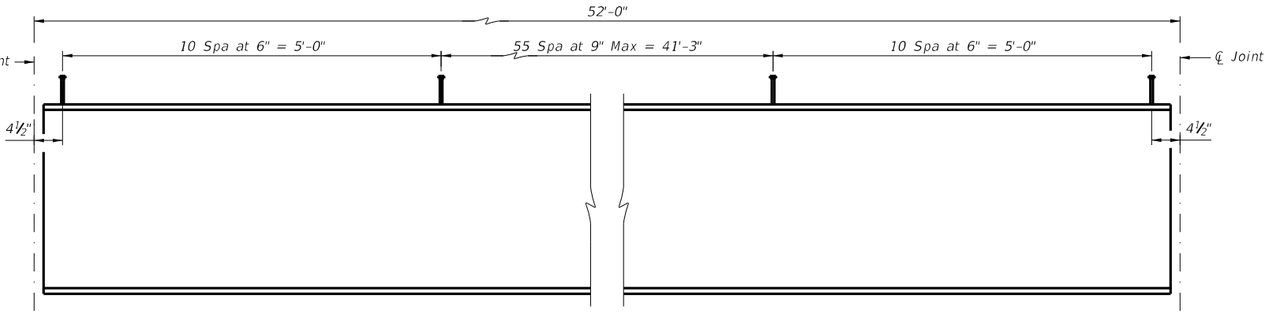
Span No.	Reinf Conc Slab	Total Reinf Steel
	SF	Lb
1, 5–8	1196	2751
Total	1196	2751 (4)

(4) Reinforcing steel weight is calculated using an approximate factor of 7.5 lbs per sq ft.

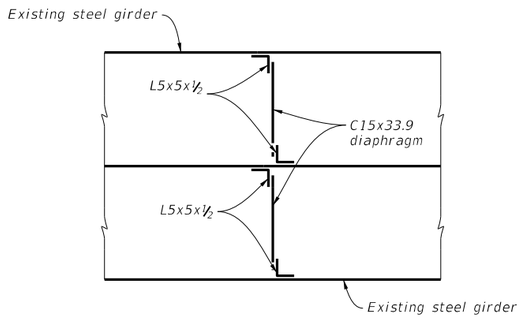
(5) Quantities for one span only.



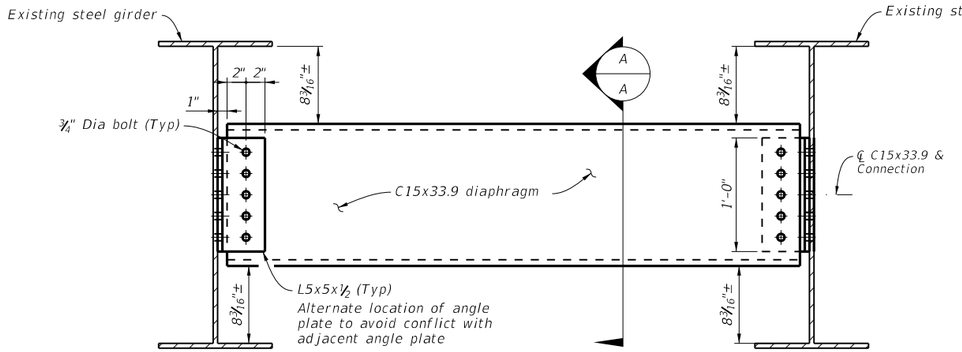
SECTION A-A



SHEAR CONNECTORS ELEVATION



SAMPLE DIAPHRAGM LAYOUT PLAN



DIAPHRAGM ELEVATION

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated – #4 = 1'-7"
Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, B, D, OA, or T unless noted otherwise.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Jan 2023).
See Armored Joint (AJ) standard sheet for details.
See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments.
See Type C1W rail details for rail anchorage in slab.
All steel diaphragms shall be ASTM A709 Gr 50 and shall be paid under "Str Steel" Item 0422 6009.
Use 4" diameter (Sch 40) PVC for deck drains. See Item 481, "Pipe for Drains" for pipe, connections, and solvent welding. Bend reinforcing steel as required to clear PVC by 1", Degrease outside of exposed PVC, apply acrylic water base primer then coat with same surface finishing material as used for utility cover plate.
Concrete posts for existing rail shall be paid under Item 0778 6024 "Concrete Post Replacement".
Concrete bump out for new posts shall be paid under new concrete slab Item 0422 6001.
Reseting existing rail channels shall be paid under Item 0778 6076 "Concrete Rail Replacement".

Cover dimensions are clear dimensions, unless noted otherwise.

03/08/2024

SHEET 3 OF 3

Texas Department of Transportation — Bridge Division

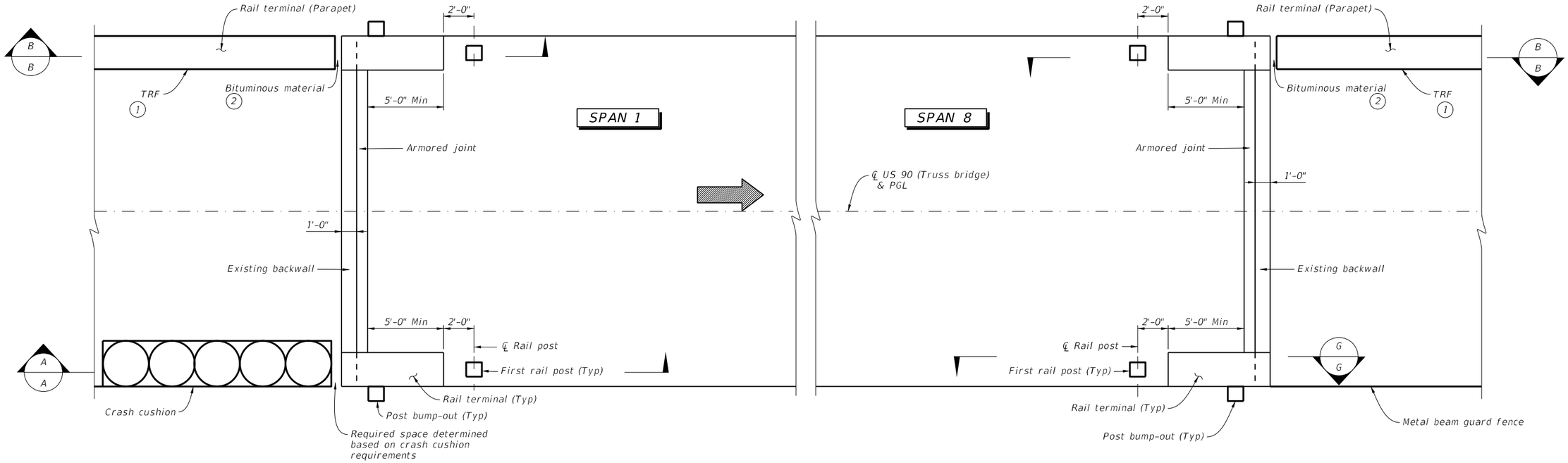
APPROACH SPAN REPAIRS

NBI: 13-045-0-0027-01-001

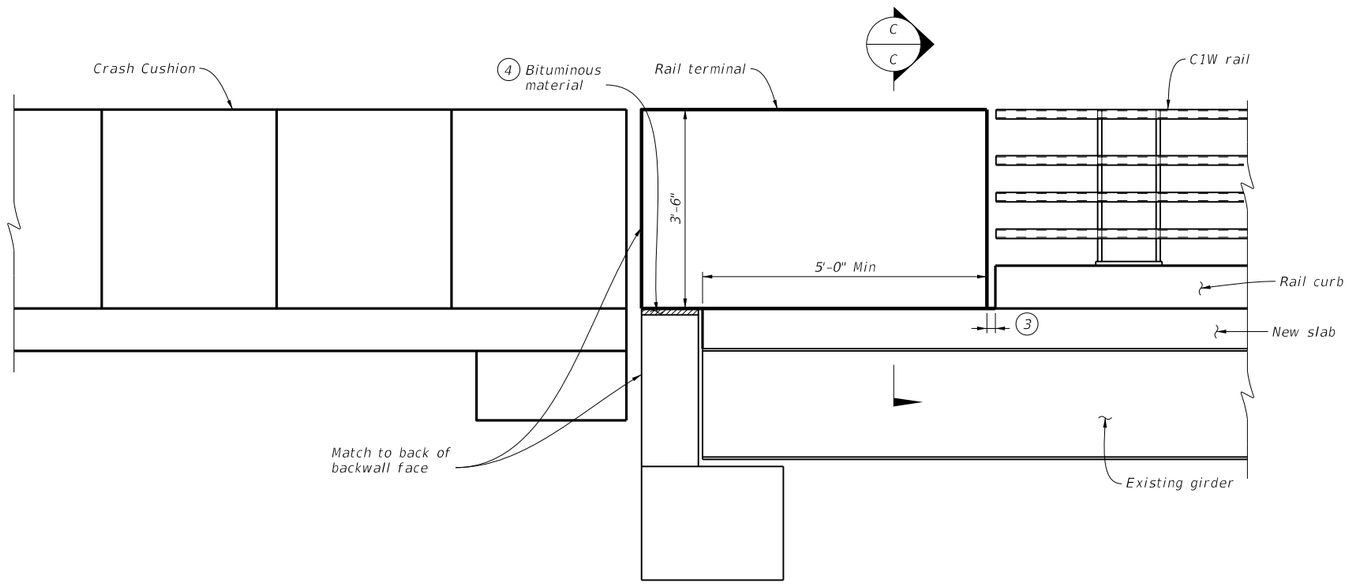
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi03.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		77

DATE: 2/16/2024 11:47:03 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi01.dgn



RAIL END TREATMENT PLAN



SECTION A-A

1. See Traffic Rail Foundations standard for details. Cost of the item is included under roadway quantities.
2. Provide ½" preformed bituminous fiber material between back of backwall and TRF grade beam. Bond to back of backwall with an approve adhesive.
3. Use same dimension as armored joint opening.
4. Provide ½" preformed bituminous fiber material between top backwall and rail terminal. Bond to top of backwall with an approved adhesive.

SHEET 1 OF 4

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation

Bridge Division

RAIL END TREATMENT DETAILS

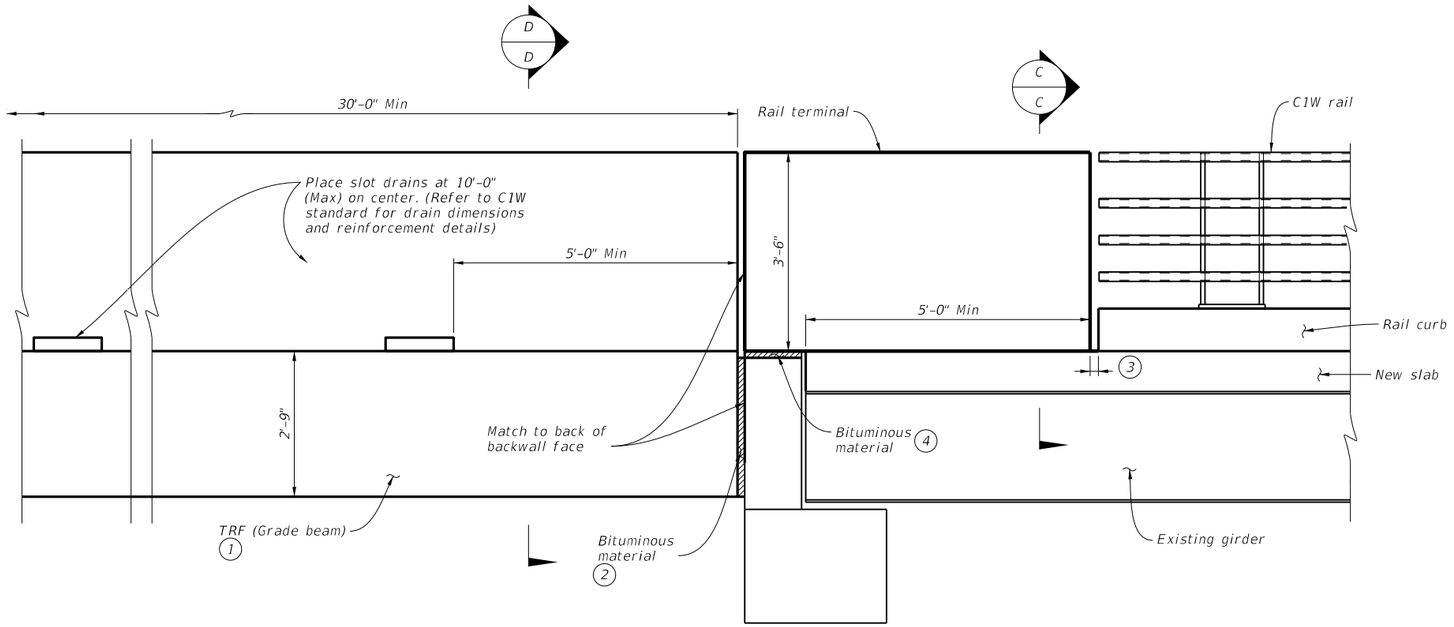
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

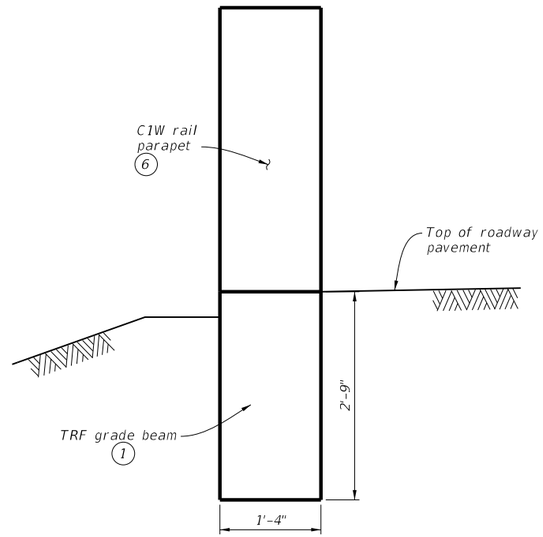
FILE: US0090_BRG_7707mi04.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		78

DATE: 2/16/2024 11:53:10 AM
FILE: pw:\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7- Bridge\US0090_BRG_7707mi04.dgn

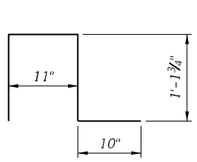
BAR TABLE	
BAR	SIZE
V	#5



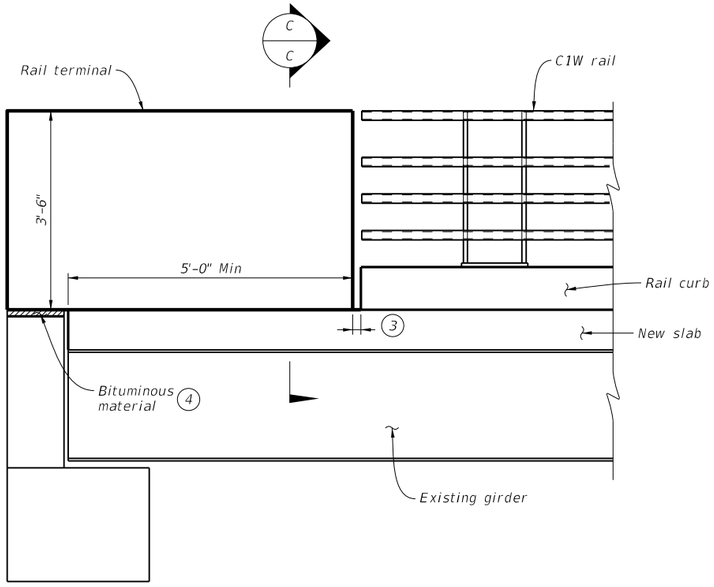
SECTION B-B



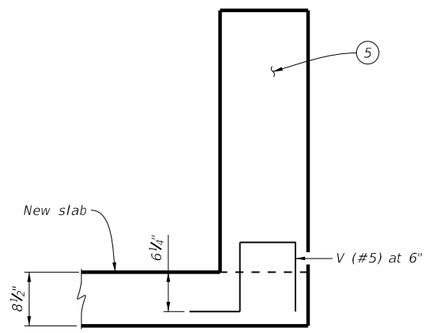
SECTION D-D



BARS V(#5)



SECTION G-G



SECTION C-C

1. See Traffic Rail Foundations standard for details. Cost of the item is included under roadway quantities.
2. Provide ½" preformed bituminous fiber material between back of backwall and TRF grade beam. Bond to back of backwall with an approve adhesive.
3. Use same dimension as armored joint opening.
4. Provide ½" preformed bituminous fiber material between top backwall and rail terminal. Bond to top of backwall with an approved adhesive.
5. See C1W rail standard for rail terminal dimensions and its reinforcement details. For rail terminal anchorage to slab, refer to section B-B of current sheet.
6. See C1W rail standard for rail terminal (parapet) dimensions and its reinforcement details. Center parapet over the middle of TRF grade beam.

03/08/2024

SHEET 2 OF 4

Texas Department of Transportation — Bridge Division

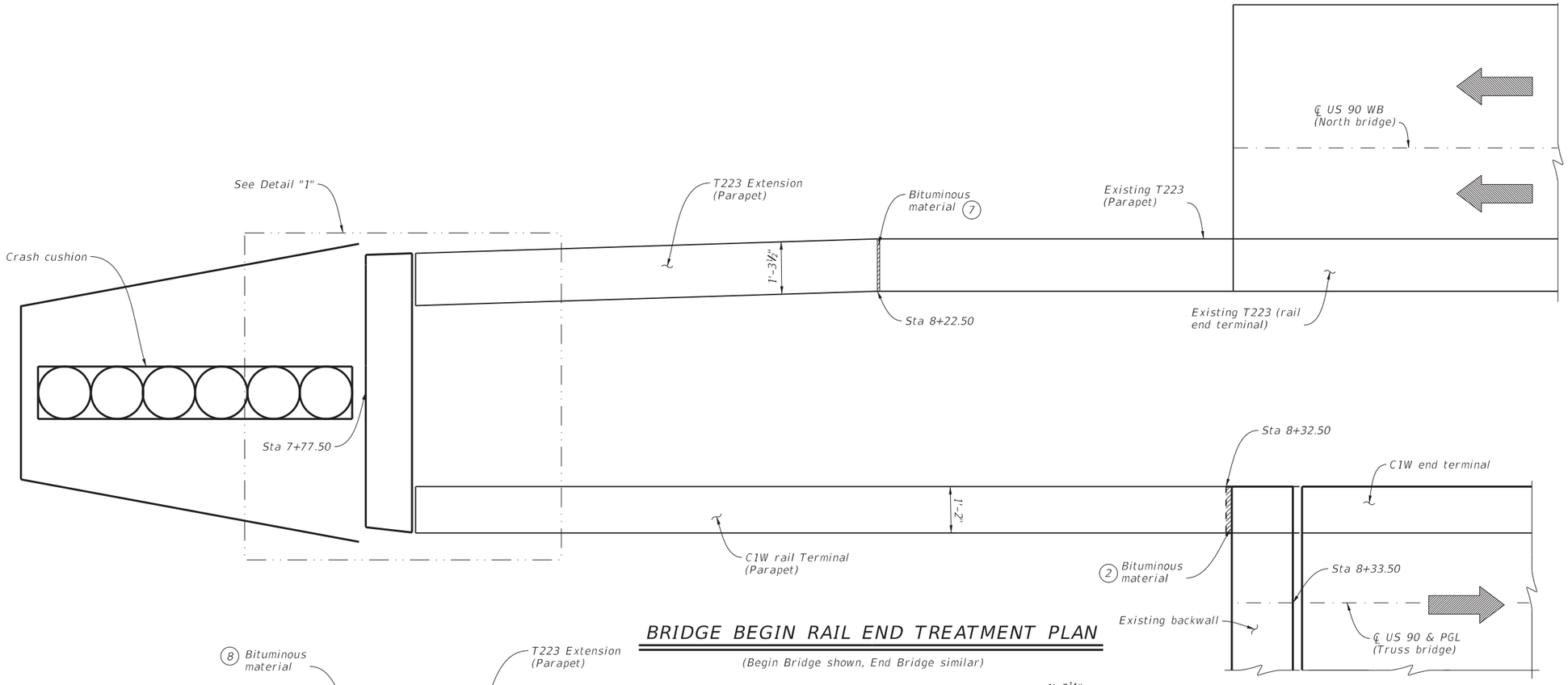
RAIL END TREATMENT DETAILS

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

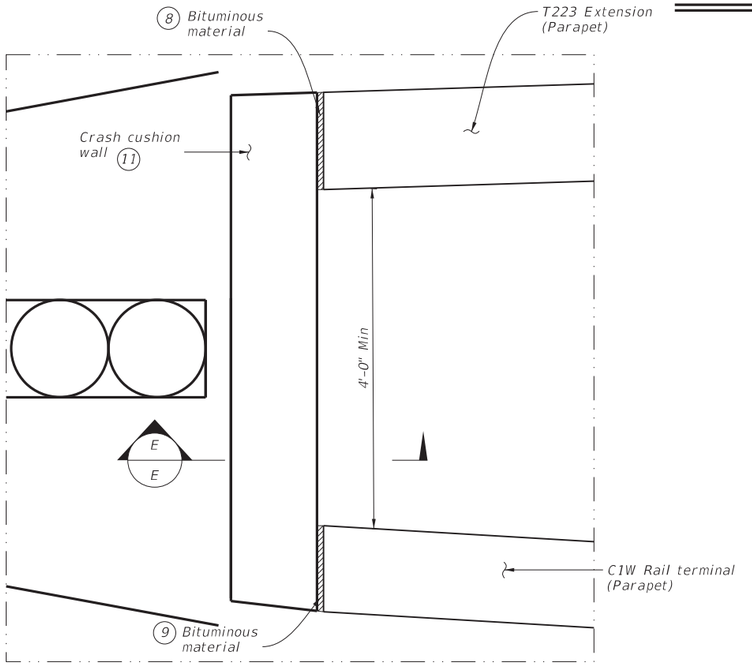
FILE: US0090_BRG_7707mi04.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024 REVISIONS	CONT.	SECT	JOB	HIGHWAY
	0027	01	042	US 90
	DIST.	COUNTY		SHEET NO.
	YKM	COLORADO		79

DATE: 2/16/2024 11:52:49 AM
FILE: pw:\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7- Bridge\US0090_BRG_7707mi04.dgn

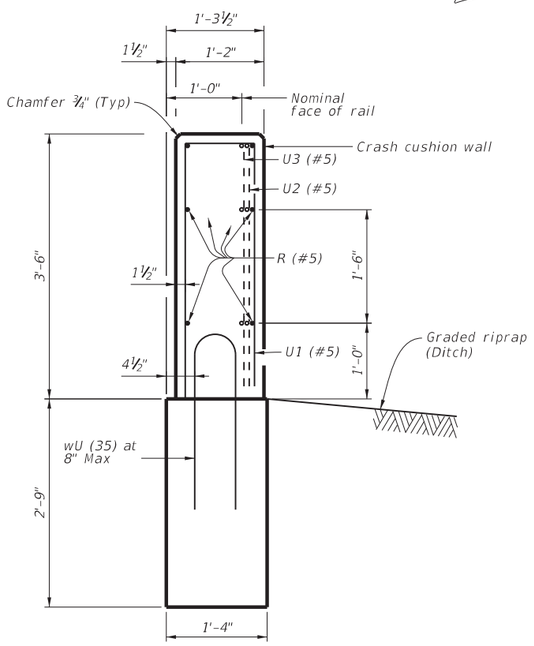


BRIDGE BEGIN RAIL END TREATMENT PLAN

(Begin Bridge shown, End Bridge similar)



DETAIL "1"



SECTION E-E

(2) Provide ½" preformed bituminous fiber material between back of backwall and TRF grade beam. Bond to back of backwall with an approve adhesive.

(7) Provide ½" preformed bituminous fiber material between existing T223 parapet and its extension. Bond to existing T223 parapet with an approved adhesive.

(8) Provide ½" preformed bituminous fiber material between T223 parapet extension and crash cushion wall. Bond to T223 parapet extension with an approved adhesive.

(9) Provide ½" preformed bituminous fiber material between C1W parapet and crash cushion wall. Bond to C1W parapet with an approved adhesive.

(11) Cost of crash cushion wall shall be included under C1W Item 0450 6029.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/26/2024

SHEET 3 OF 4

Texas Department of Transportation | Bridge Division

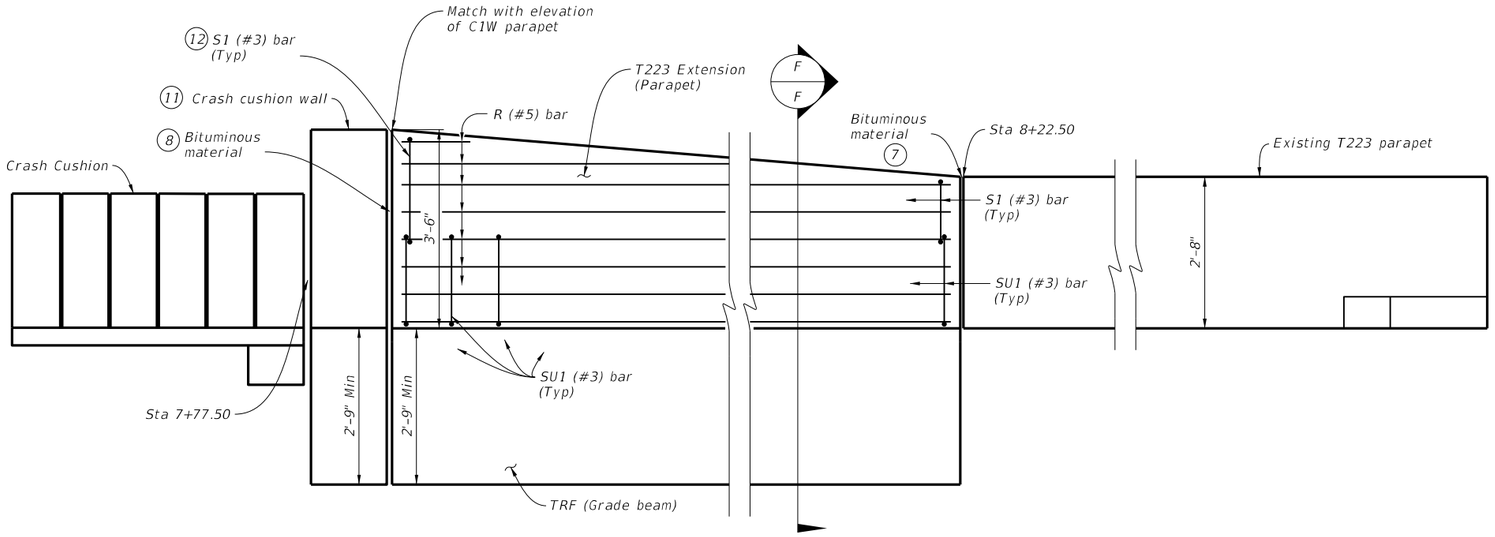
RAIL END TREATMENT DETAILS

NBI: 13-045-0-0027-01-001

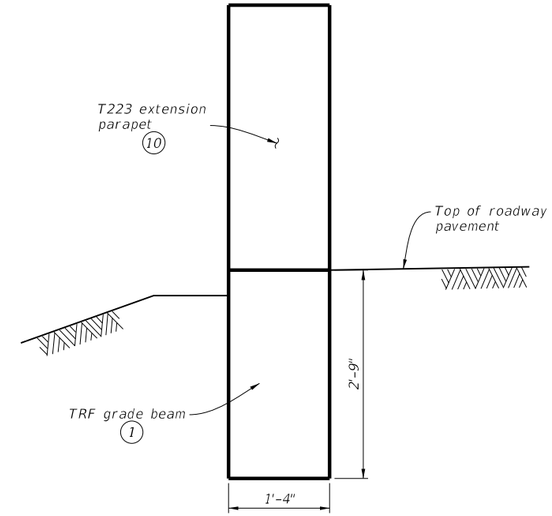
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi04.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		80

DATE: 2/16/2024 11:52:32 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7 - Bridge\US0090_BRG_7707mi04.dgn



EXISTING BRIDGE RAIL END TREATMENT ELEVATION



SECTION F-F

TRUSS BRIDGE RAIL END TREATMENT ELEVATION

(1) See Traffic Rail Foundations standard for details. Cost of the item is included under roadway quantities

(7) Provide ½" preformed bituminous fiber material between existing T223 parapet and its extension. Bond to existing T223 parapet with an approved adhesive.

(8) Procide ½" preformed bituminous fiber material between T223 parapet extension and crash cushion wall. Bond to T223 parapet extension with an approved adhesive.

(9) Provide ½" preformed bituminous fiber material between C1W parapet and crash cushion wall. Bond to C1W parapet with an approved adhesive.

(10) See T223 rail standard for rail parapet dimensions and reinforcement details not shown. Center parapet over the middle of TRF Grade Beam.

(11) Cost of crash cushion wall shall be included under C1W Item 0450 0029.

(12) Contractor shall adjust S1 bar vertical leg to meet variable height of the parapet. The cost of the T223 extension (Parapet) shall be included under T223 rail Item 0450 6006.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

RAIL END TREATMENT DETAILS

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi04.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		81

DATE: 2/16/2024 11:52:32 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7- E

TABLE OF REPAIRS

TRUSS REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANITITY	REPAIR DESCRIPTION
	0422 6001	REINF CONC SLAB	SF	17858	Pour new deck for all spans
	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	200	Repair concrete bent cap (bent 7)
	0442 6008	STR STEEL (MISCELLANEOUS BRIDGE)	LB	100	Steel plates to repair members with section loss
	0442 6009	STR STEEL (DIAPHRAGM & STIFFENER)	LB	8415	Install diaphragms for approach span interior bents only
	0442 6010	STR STEEL (SHEAR CONNECTOR)	LB	19361	Install shear connectors
	0442 6023	STR STEEL (MISC NON - BRIDGE TYPE 1)	EA	1	Reattached disconnected conduit connections
	0446 6029	CLEAN & PAINT EXIST STR (REF NO.1)	LS	1	Sand blast and repaint all steel members
	0446 6030	CLEAN & PAINT EXIST STR (REF NO.2)	LS	1	Sand blast and repaint all steel members
	0446 6031	CLEAN & PAINT EXIST STR (REF NO.3)	LS	1	Sand blast and repaint all steel members
	0450 6029	RAIL (TY C1W)	LF	1735.1	Install new rail for all spans
	0454 6004	ARMOR JOINT (SEALED)	LF	69	Install new armor joint
	0454 6018	SEALED EXPANSION JOINT (4 IN) (SEJ-M)	LF	92	Install new expansion joint
	0481 6011	PIPE (PVC) (SCH 40) (4 IN)	LF	341	Install down drain pipe for all spans
	0496 6058	REMOV STR (BRIDGE SLAB)	LF	765.5	Remove existing deck for all spans
	0636 6009	REPLACE EXISTING ALUMINUM SIGNS (TY O)	SF	14	Replace existing clearance sign with updated dimension
	0778 6024	CONCRETE POST REPLACEMENT	EA	90	Remove and dispose existing concrete rail posts (approach spans only)
	0778 6076	CONCRETE RAIL REPLACEMENT (IN-KIND)	LF	520	Install new concrete rail posts (approach spans only)
1	0784 6004	REP STL BRIDGE MEMBER (TRUSS VERTICAL)	EA	2	Repair/replace dented channel member
2	0784 6005	REP STL BRIDGE MEMBER (TRUSS DIAGONAL)	EA	3	Repair corroded member
3	0784 6006	REP STL BRIDGE MEMBER(TRUSS SWAY BRACE)	EA	7	Repair member due to section loss
4	0784 6011	REP STL BRIDGE MEMBER (BOTTOM CHORD)	EA	10	Replace connection plate due to section loss
5	0784 6012	REP STL BRIDGE MEMBER (TOP CHORD)	EA	1	Replace connection plate due to section loss
6	0784 6013	REP STL BRIDGE MEMBER (ENDPOST)	EA	12	Replace all damaged lacing plates
7	0784 6021	REP STL BRDG MEMB (TRUSS PORTAL BRACE)	EA	3	Repair/replace portal member due to pack rust
8	0784 6022	REP STL BRIDGE MEMBER (FLOORBEAM)	EA	9	Repair member due to section loss
9	0784 6028	REP STL BRIDGE MEMBER (STRINGER)	EA	3	Repair member due to section loss
10	0784 6032	REP STL BRIDGE MEMBER (GUSSET CON)	EA	18	Replace gusset plate due to section loss
11	0784 6034	REP STL BRIDGE MEMBER(STRAIGHTEN MEMB)	EA	16	Heat straighten dented member
12	0784 6038	REP STL BRIDGE MEMBER(REPL RIVET/BOLT)	EA	13500	Replace missing rivets or bolts

GENERAL NOTES:

Perform repairs indicated in the TABLE OF REPAIRS table, and repair any damage caused by the contractor's operations in accordance with Item 0784, "Steel Member Repair".

Perform all structural steel repairs in the presence of a TxDOT structural steel inspector. Allow at least two weeks notice to schedule inspector prior to beginning repairs.

Take care not to damage existing floor beams, stringers, and truss rails during deck removal of span 2, span 3, and span 4. Any damage caused by the Contractor operations will be repaired at the Contractor's expense.

Notify the Engineer of Record of any damage, including impact damage and section loss, not addressed in the plans.

Rivets, found to have 25% or more section loss of rivet head, need to be replaced with bolts. Replace existing bolts or rivets that are removed, damaged, or missing with ASTM F3125 Grade F1852 bolts of the same diameter as the original fastener, except where otherwise indicated in the plans.

Contact the Engineer to coordinate third party paint inspection a minimum of two weeks prior to the preconstruction meeting. The Engineer will arrange with TxDOT Materials Test Division Coatings and Traffic Materials Section at MTD_Paint@txdot.gov for the presence of MTD and/or third-party inspector presence at the preconstruction meeting.

Paint set up and completed paint job must be approved by a TxDOT paint inspector. Allow a minimum two weeks notice to schedule paint inspector.

Prime coat faying surfaces. When metal contact surfaces are exposed by the removal of rivets, clean the surfaces and apply the required prime coat in accordance with Item 0446, "Field Cleaning and Painting Steel".

Clean and paint trusses and rails on all spans (including existing and new rails on the approach spans) in accordance with Item 0446, "Field Cleaning and Painting Steel". Provide system IIIA for all spans.

Use ASTM A709 Grade 50 steel for all repairs.

Clean and lubricate existing bearings using Prelube 19 or approved equivalent. The tasks perfomed for bearings shall be paid under Item 0446 "Clear and Paint Exist Str".

For rail components, galvanize all bolts, nuts, washers, and pipe sleeves, in accordance with Item 0445, " Galvanizing".

Existing steel rail channels shall be retained, cleaned and painted in accodance with Item 0446 "Field Cleaning and Painting Steel'. Reconditioned rail channels shall be reinstalled (see Approach Span Details Sheets) for directions.

Salvage existing channels during rail removal. Existing channels are to be installed with reconstructed rail. Payment for rail removal and reconstruction, including salvaging and reinstallation of steel channels is in accordance with Item 0778 6076 "Concrete Rail Replacement (In kind)".

Cost of removal of existing bridge rail shall be subsidiary to Bid Item No. 0496 6058 "REMOV STR (BRIDGE SLAB)".

Cost of placement of new rail curb shall be subsidiary to Bid Item No. 0450 6029 "RAIL (TY C1W)."

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/15/2024

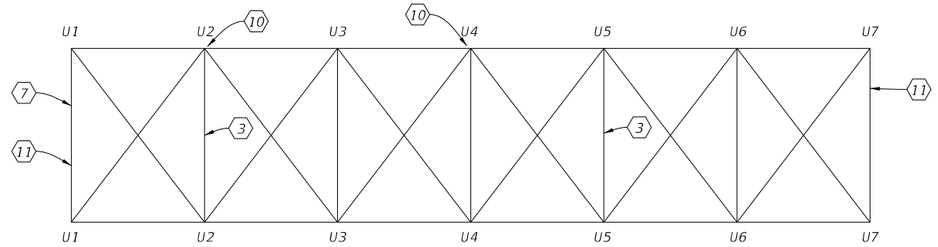
Texas Department of Transportation | Bridge Division

REPAIR SUMMARY AND DESCRIPTIONS

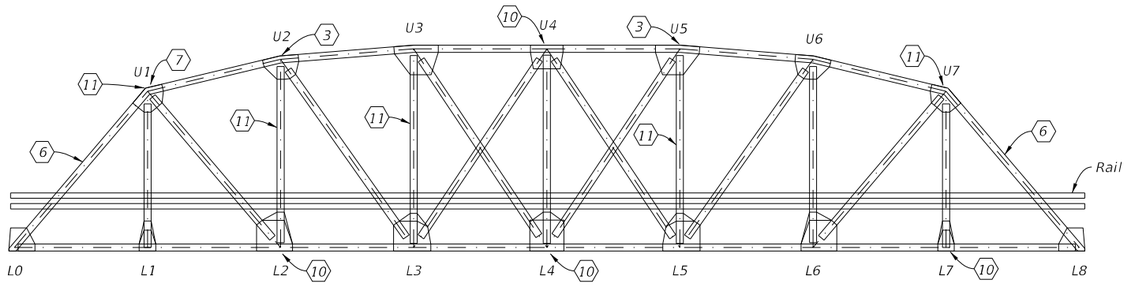
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi05.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		82

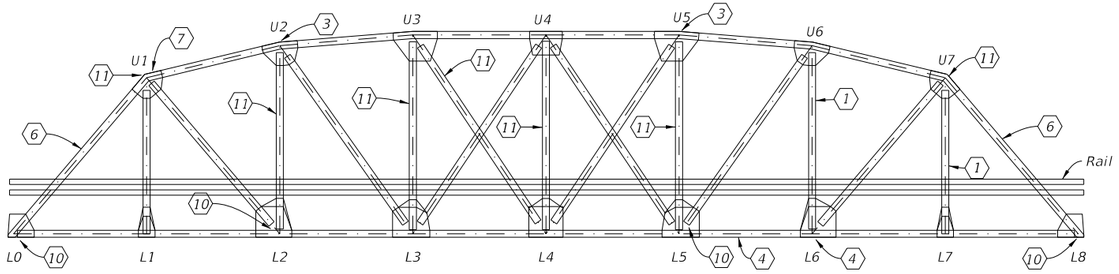
DATE: 1/29/2024 2:50:36 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi05.dgn



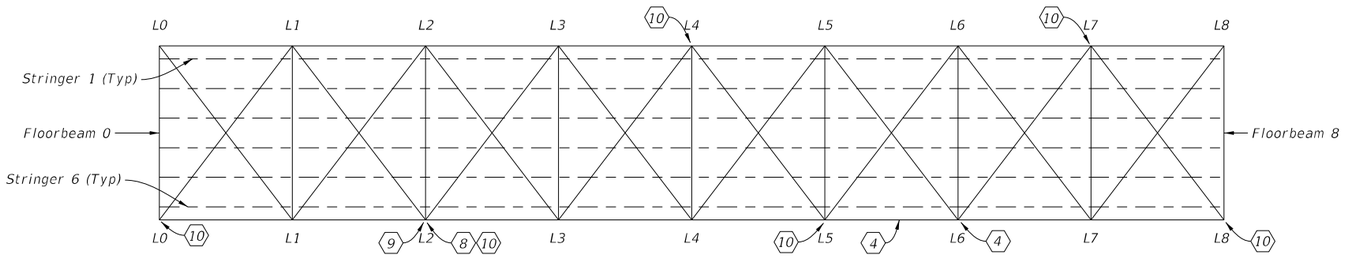
PLAN VIEW



NORTH TRUSS ELEVATION



SOUTH TRUSS ELEVATION



PLAN VIEW

⬡ = Truss Repair No. See "Truss Repair Summary and Descriptions"

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation

Bridge Division

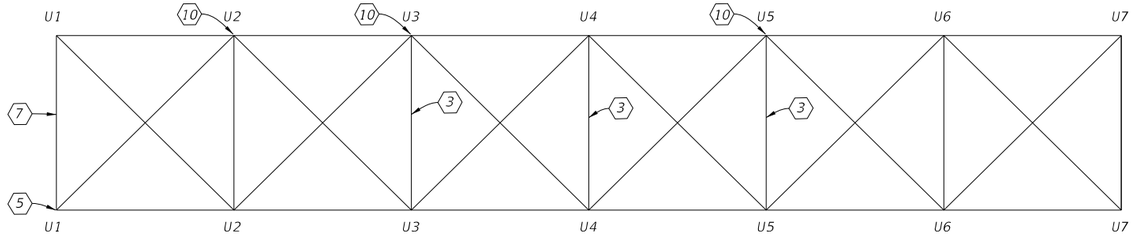
SPAN NO. 2
TRUSS REPAIRS

NBI: 13-045-0-0027-01-001

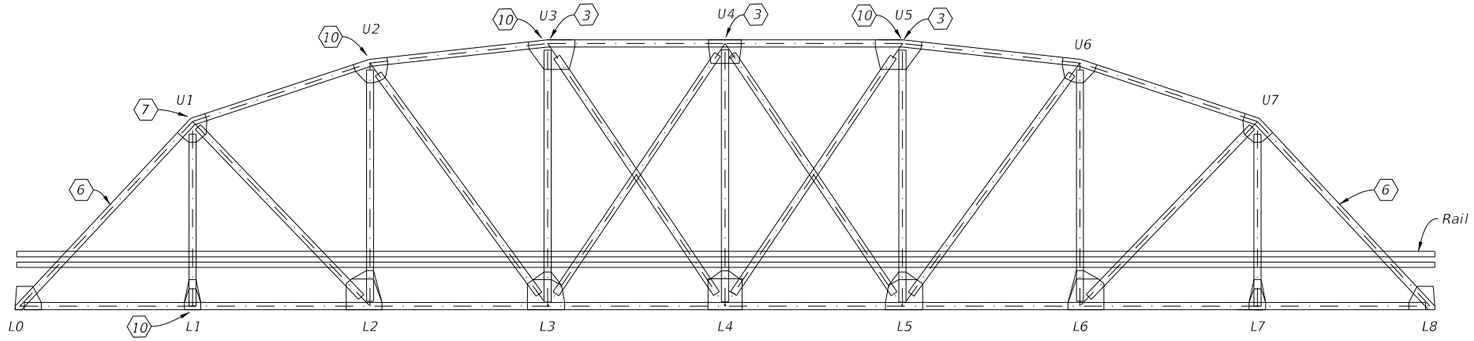
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi06.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		83

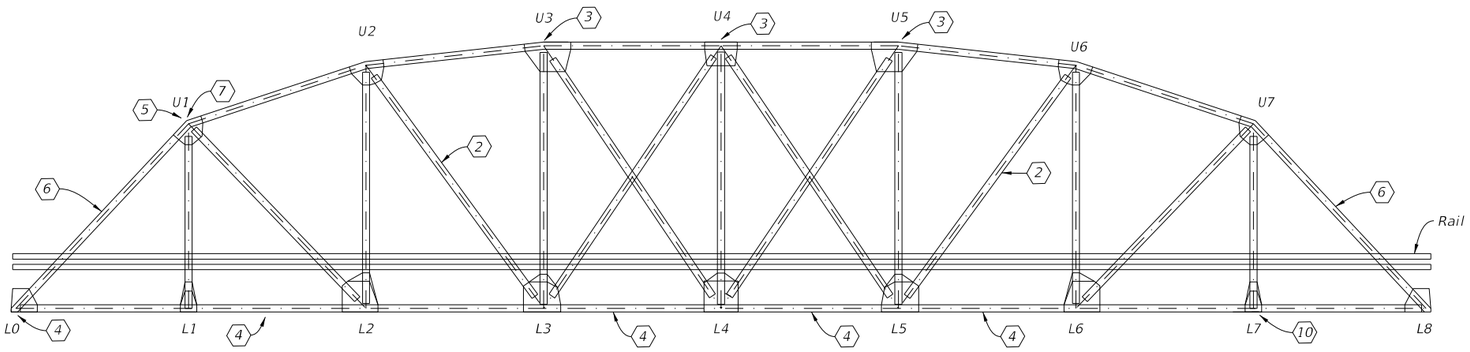
DATE: 12/19/2023 10:45:01 AM
FILE: pw:\\txdot-projectwiseonline.com\TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi06.dgn



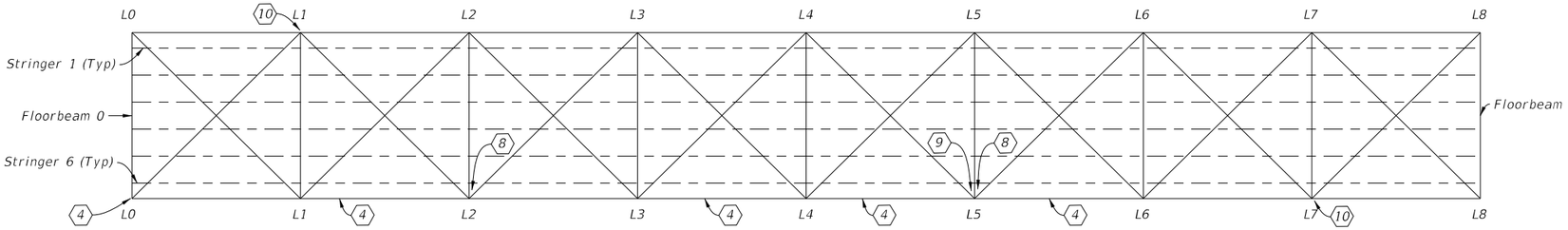
PLAN VIEW



NORTH TRUSS ELEVATION



SOUTH TRUSS ELEVATION



PLAN VIEW

= Truss Repair No. See "Truss Repair Summary and Descriptions"

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation

Bridge Division

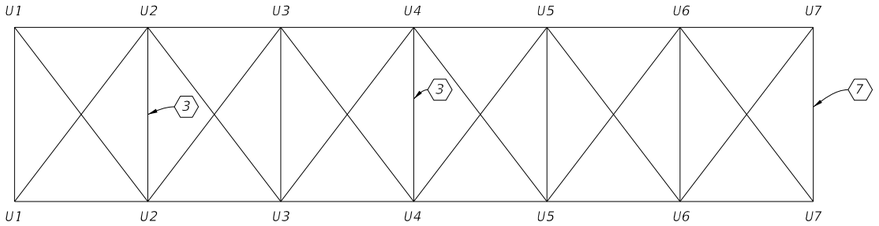
SPAN NO. 3
TRUSS REPAIRS

NBI: 13-045-0-0027-01-001

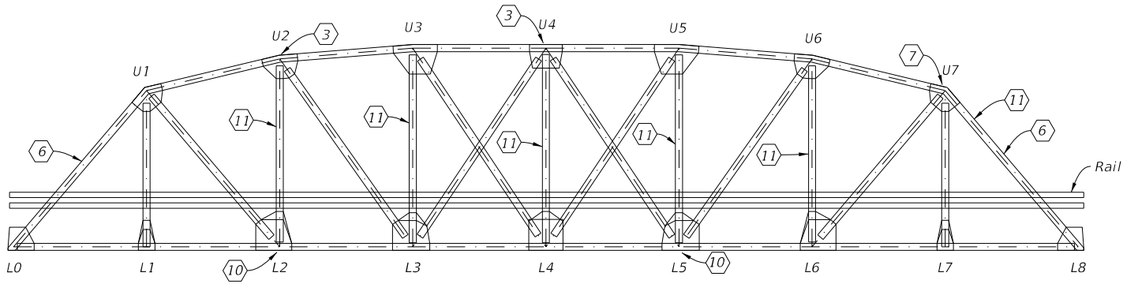
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi07.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU	
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0027	01	042	US 90	
	DIST	COUNTY		SHEET NO.	
	YKM	COLORADO		84	

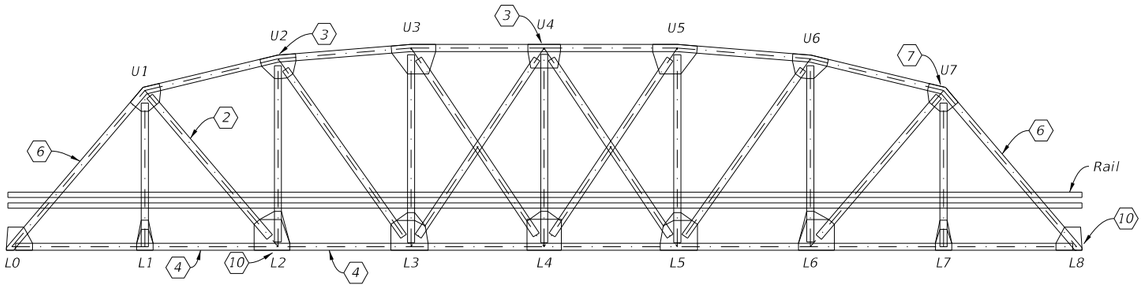
DATE: 12/19/2023 10:45:50 AM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\00270104\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi07.dgn



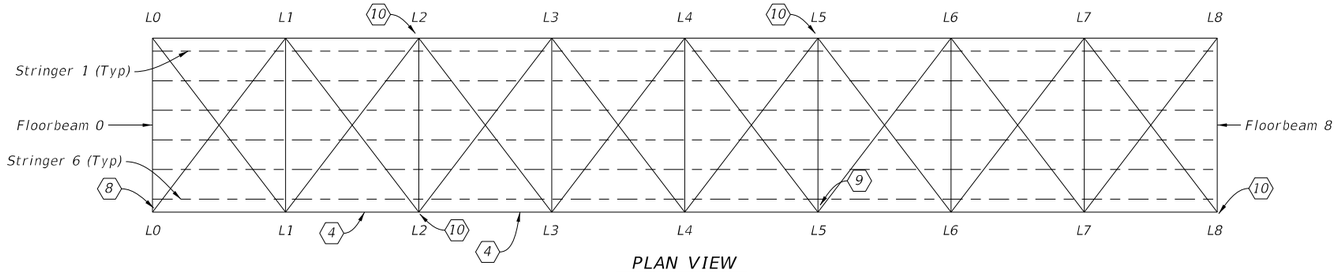
PLAN VIEW



NORTH TRUSS ELEVATION



SOUTH TRUSS ELEVATION



PLAN VIEW

⬡ = Truss Repair No. See "Truss Repair Summary and Descriptions"

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation

Bridge Division

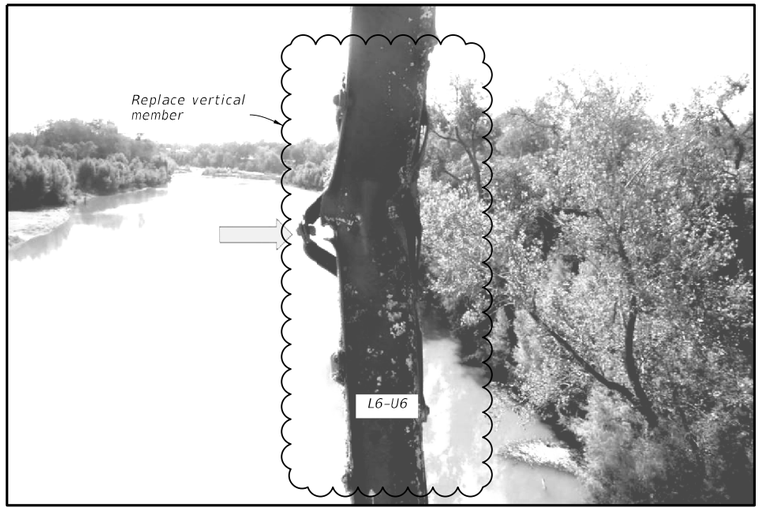
SPAN NO. 4
TRUSS REPAIRS

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

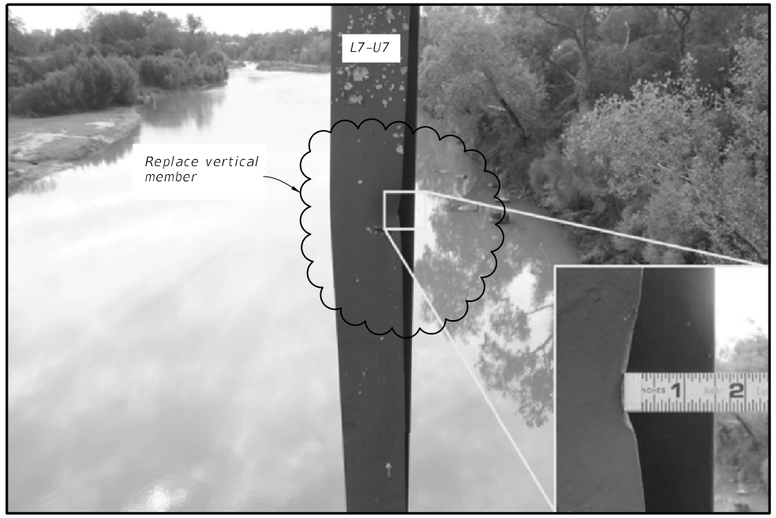
FILE: US0090_BRG_7707mi08.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		85

DATE: 12/19/2023 10:46:43 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi08.dgn



VERTICAL MEMBER AT SPAN 2 SOUTH TRUSS (L6-U6)

(Replace vertical due to impact damage)



VERTICAL MEMBER AT SPAN 2 SOUTH TRUSS (L7-U7)

(Replace vertical due to impact damage)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

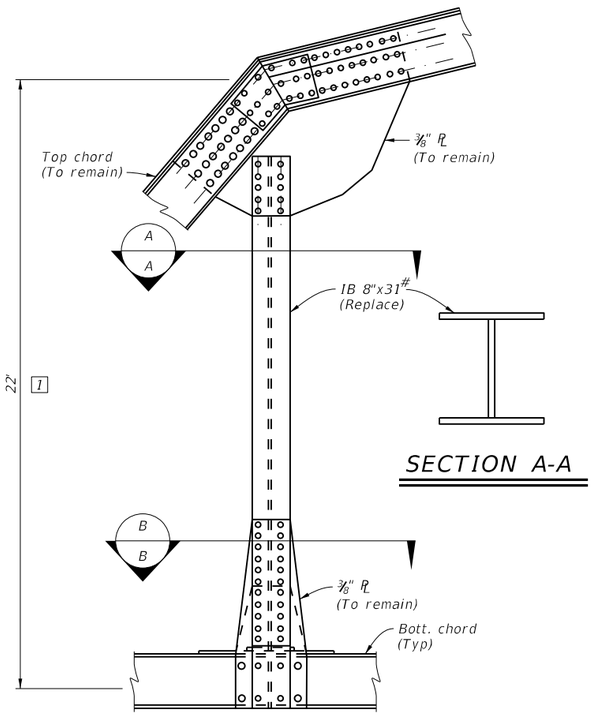
Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

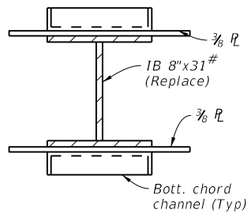
In lieu of IB 8x31, use W 8x31 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.



SECTION A-A



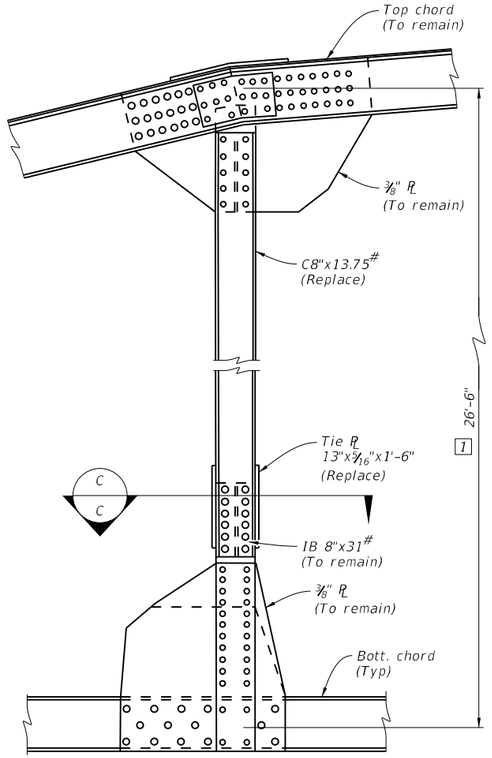
SECTION B-B

SPAN 2 VERTICAL MEMBER

(L7-U7)

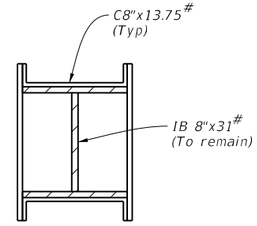
1 This dimension does not represent length of the replacement member, but mere approximate height of overall veritical (refer to attached record documments and field measurements for exact length of the repalcement member).

NOTE:
Floorbeam diagonal members not shown for clarity.



SPAN 2 VERTICAL MEMBER

(L6-U6)



SECTION C-C

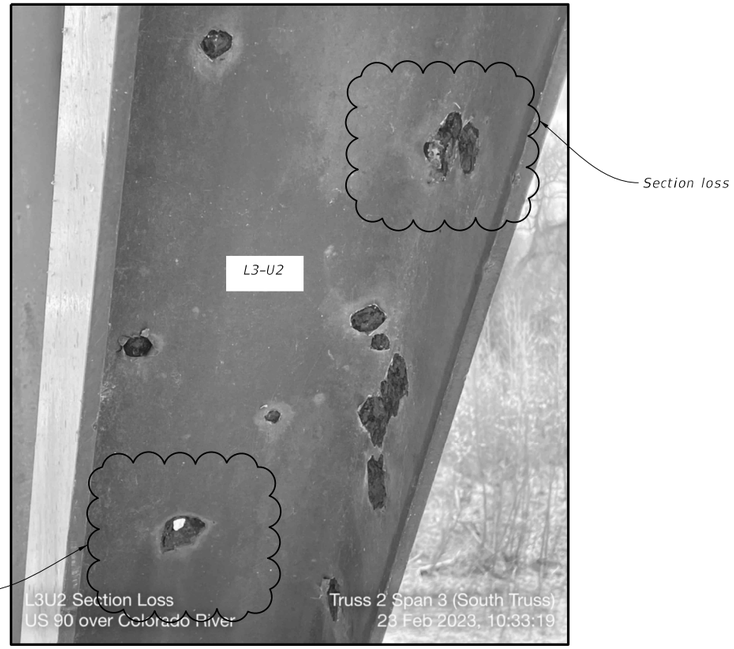
03/08/2024

Texas Department of Transportation — Bridge Division

REPAIR NO. 1
TRUSS VERTICAL
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

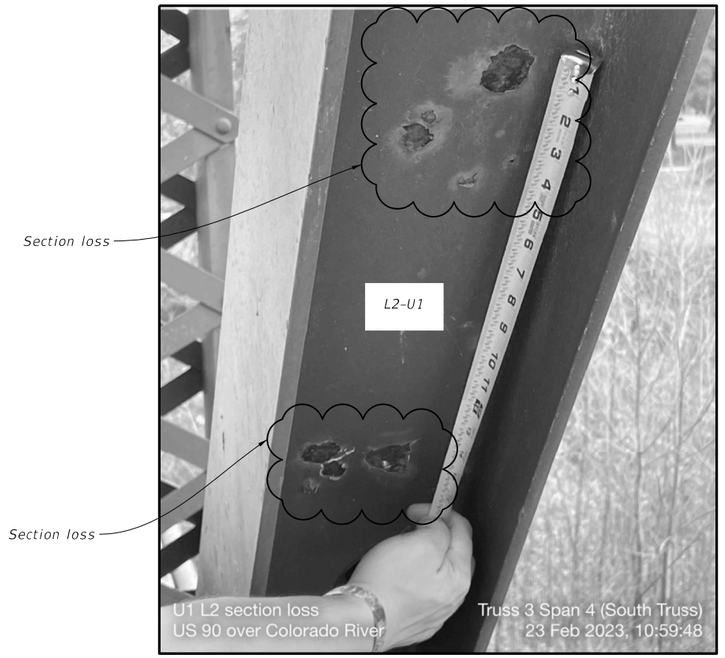
FILE: US0090_BRG_7707mi09.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		86

DATE: 12/19/2023 11:01:14 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010402\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



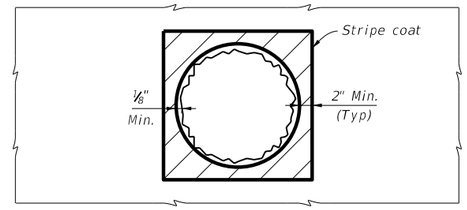
DIAGONAL MEMBER AT SPAN 3 SOUTH TRUSS (L3-U2)

(Repair or replace member due to section loss)

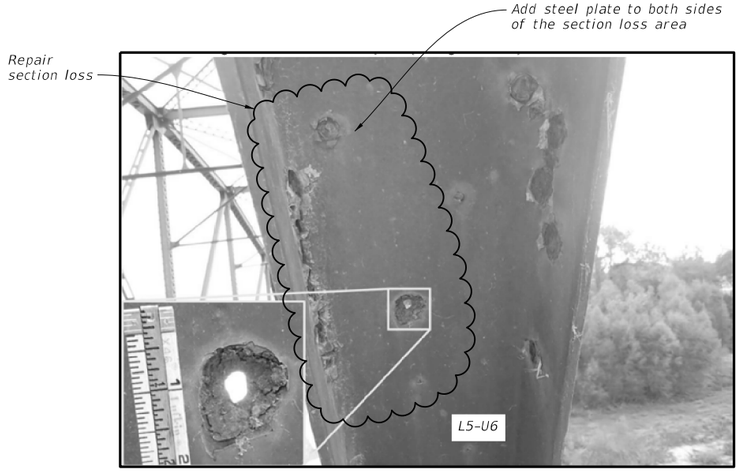


DIAGONAL MEMBER AT SPAN 4 SOUTH TRUSS (L2-U1)

(Repair or replace member due to section loss)

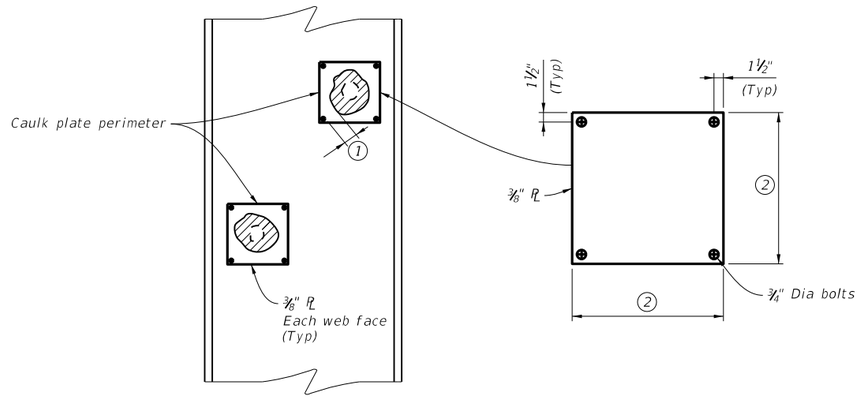


CORROSION HOLE DETAIL



DIAGONAL MEMBER AT SPAN 3 (SOUTH) (L5-U6)

(Repair or replace member due to section loss)



DIAGONAL REPAIR DETAIL

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

REPAIR PROCEDURE:

1. Keep minimum clear spacing of 1", between corrosion effected area and edge of hole.
2. Contractor shall determine size of plate based on section loss area. Larger plates may be used to repair multiple holes, but do not remove more web material than is necessary to clean the hole.
3. Drill corrosion holes using a drill bit up to ¼" larger than the nominal diameter of the corrosion hole. Ensure edges of holes are smooth. Clean and paint an area extending 2" minimum on all sides around the repair area on both sides (if accessible) and inside the hole. See Corrosion Hole Detail for more information.
4. Apply a stripe coat of paint to all areas repaired by hole drilling. Obtain approval from the Engineer before painting repair areas.
5. Torches may not be used to create holes in members.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and linform Engineer of record of any inconsistencies.

Caulking plate perimeter shall be in accordance with Department Material Specifications (DMS)-8142.

Cost of repair plates shall be paid under Item 0442 6008 "Str Steel Miscellaneous Bridge".

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

REPAIR NO. 2
TRUSS DIAGONAL
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi10.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		87

DATE: 12/28/2023 4:01:42 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\v4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi10.dgn

SWAY BRACE AT SPAN 2 (U5-U5)

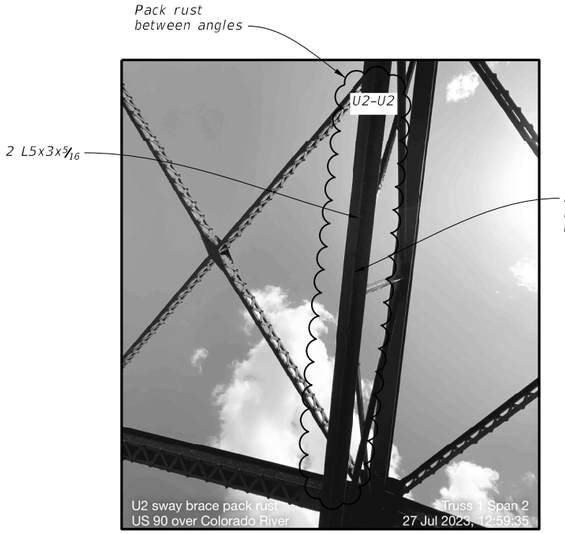
(Replace member due to pack rust)

SWAY BRACE AT SPAN 3 (U3-U3)

(Replace member due to pack rust)

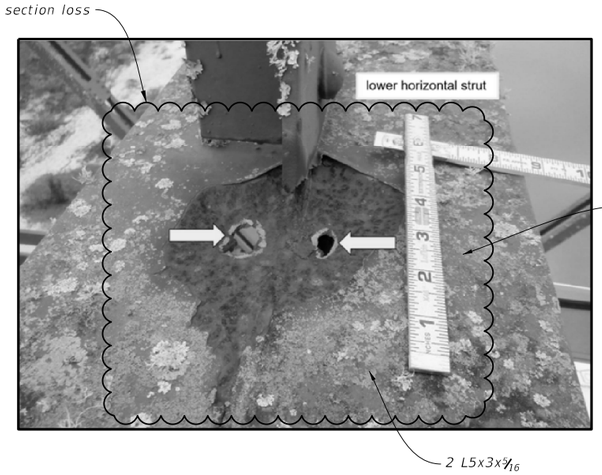
BOTTOM HORIZONTAL STRUT SPAN 3 (U5)

(Replace strut due to section loss)



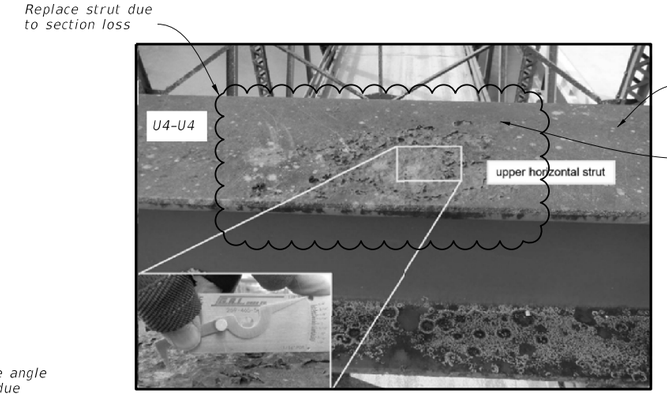
SWAY BRACE AT SPAN 2 (U2-U2)

(Replace member due to pack rust)



SWAY BRACE AT SPAN 3 (U4-U4)

(Replace member due to section loss)



TOP HORIZONTAL STRUT SPAN 4 (U4)

(Replace strut due to section loss)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

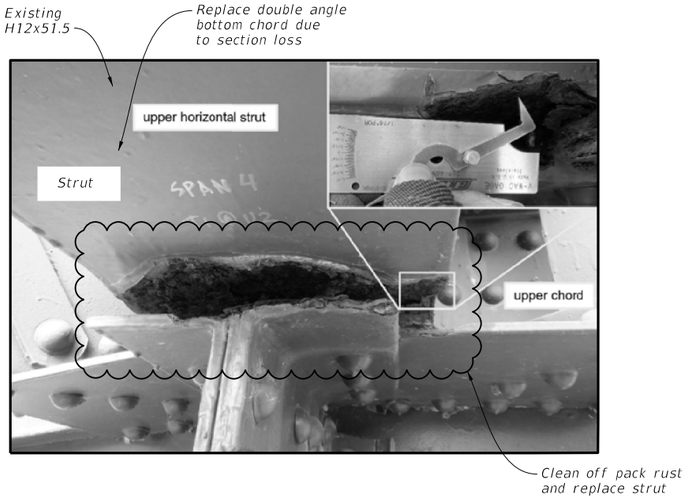
SHEET 1 OF 2

Texas Department of Transportation — Bridge Division

REPAIR NO. 3
TRUSS SWAY BRACE
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi11.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		88

DATE: 1/4/2024 3:31:45 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



TOP HORIZONTAL STRUT SPAN 4 (U2)

(Replace strut due to section loss)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

In lieu of H12x51.5, use H12x53 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

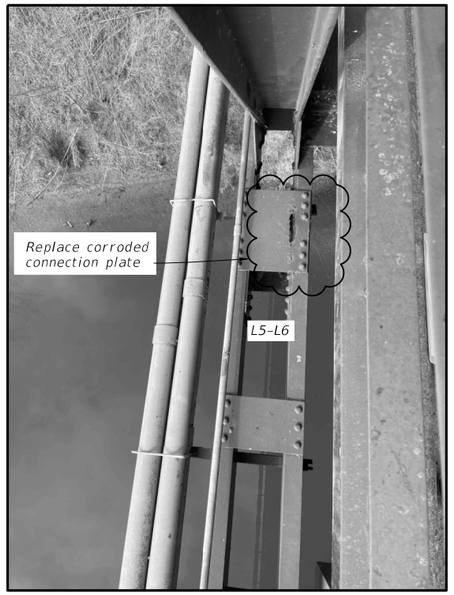
SHEET 2 OF 2

Texas Department of Transportation | Bridge Division

REPAIR NO. 3
TRUSS SWAY BRACE
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

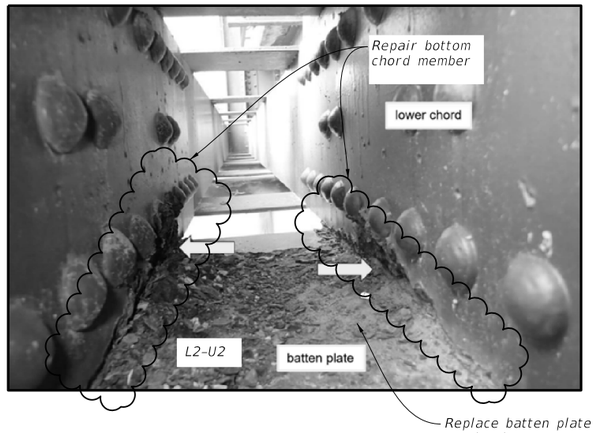
FILE: US0090_BRG_7707mi11.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		89

DATE: 1/4/2024 3:31:45 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



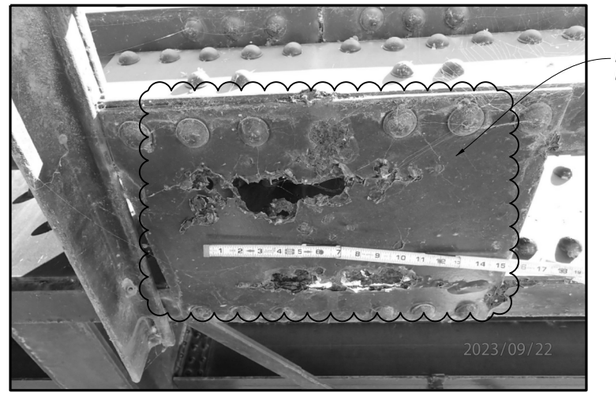
BOTTOM CHORD AT SPAN 2 (SOUTH) (L5-L6)

(Replace batten plate due to section loss)



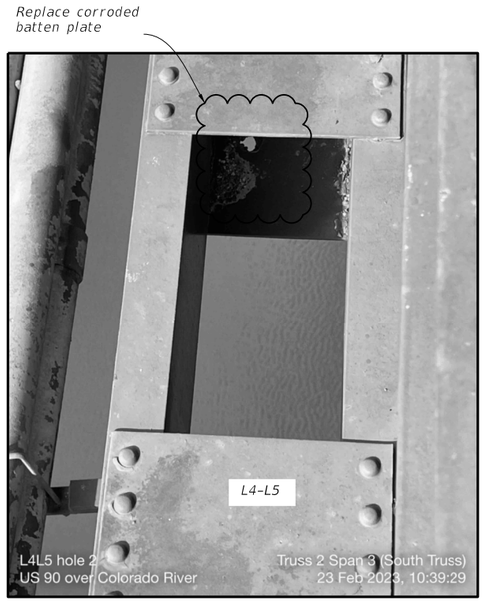
BOTTOM CHORD AT SPAN 4 (SOUTH) (L1-L2)

(Replace batten plate due to section loss & repair chord member)



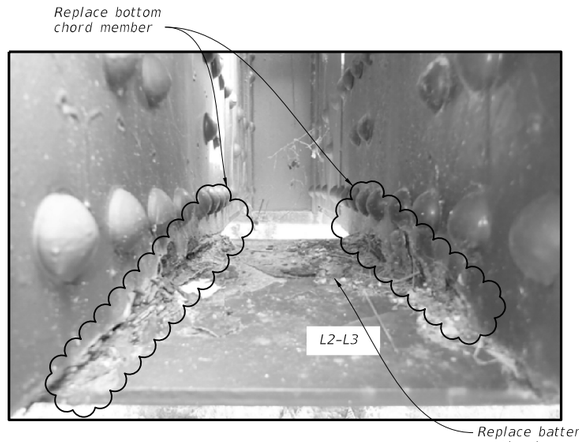
BOTTOM CHORD AT SPAN 2 (SOUTH) (L6)

(Replace batten plate segment due to section loss)



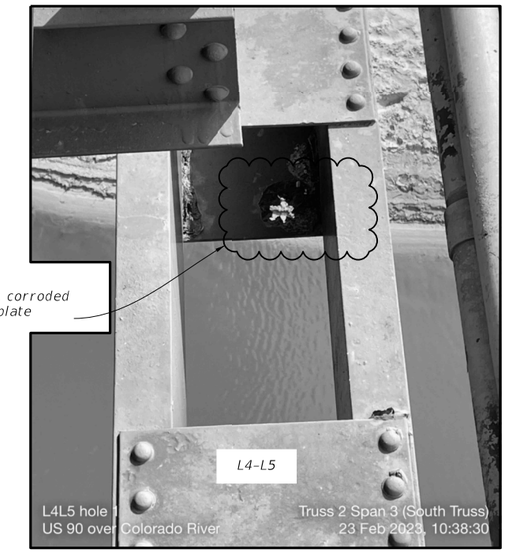
BOTTOM CHORD AT SPAN 3 (SOUTH) (L4-L5)

(Replace batten plate due to section loss)



BOTTOM CHORD AT SPAN 4 (SOUTH) (L2-L3)

(Replace batten plate due to section loss)



BOTTOM CHORD AT SPAN 3 (SOUTH) (L4-L5)

(Replace batten plate due to section loss)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

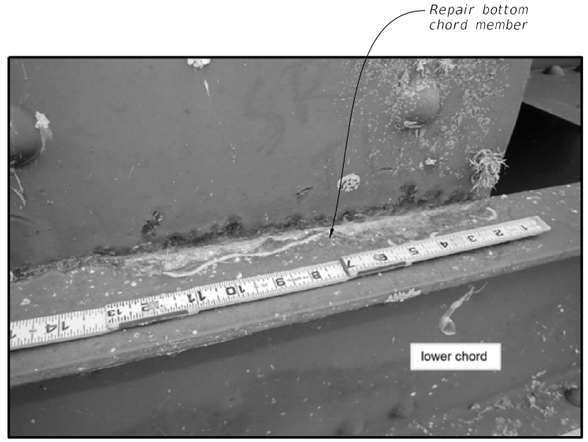
SHEET 1 OF 3

Texas Department of Transportation — Bridge Division

REPAIR NO. 4
TRUSS BOTTOM CHORD
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

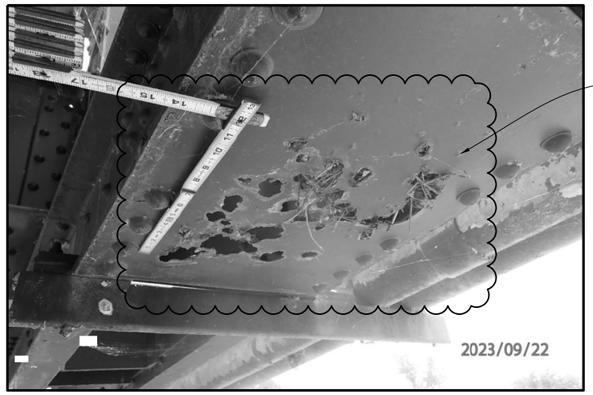
FILE: US0090_BRG_7707mi12.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST.	COUNTY		SHEET NO.
	YKM	COLORADO		90

DATE: 1/4/2024 4:45:10 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010420\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



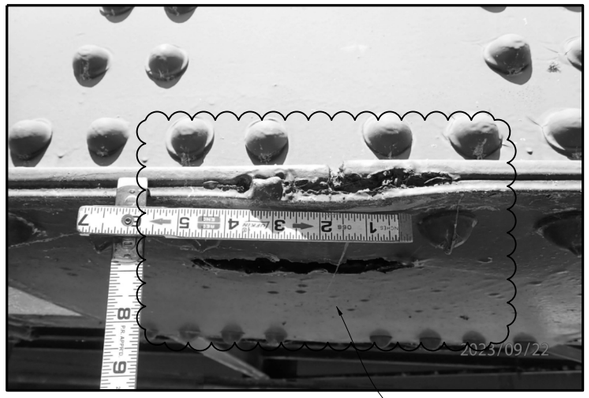
BOTTOM CHORD AT SPAN 3 (SOUTH) (L0)

(Repair bottom chord channel due to section loss)



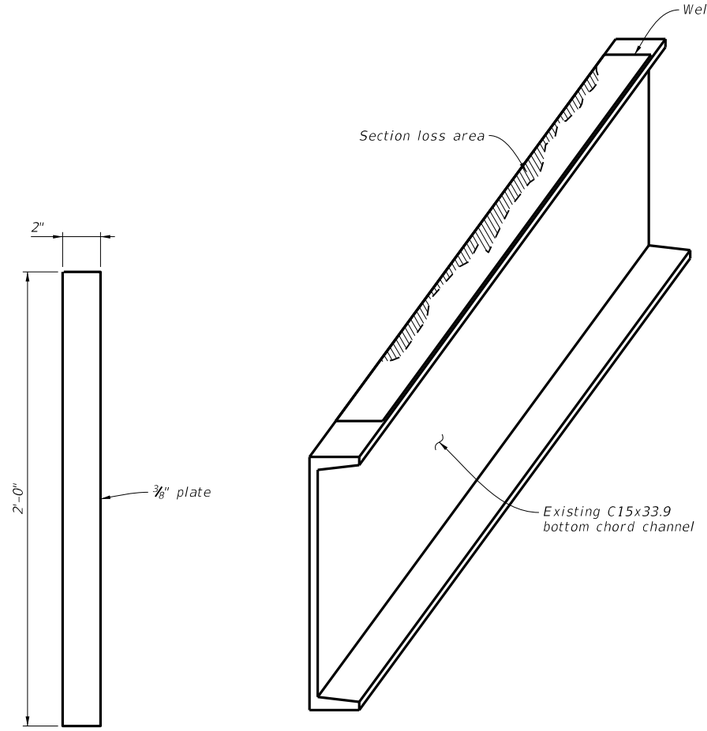
BOTTOM CHORD AT SPAN 3 (SOUTH) (L3-L4)

(Replace splice plate due to section loss)

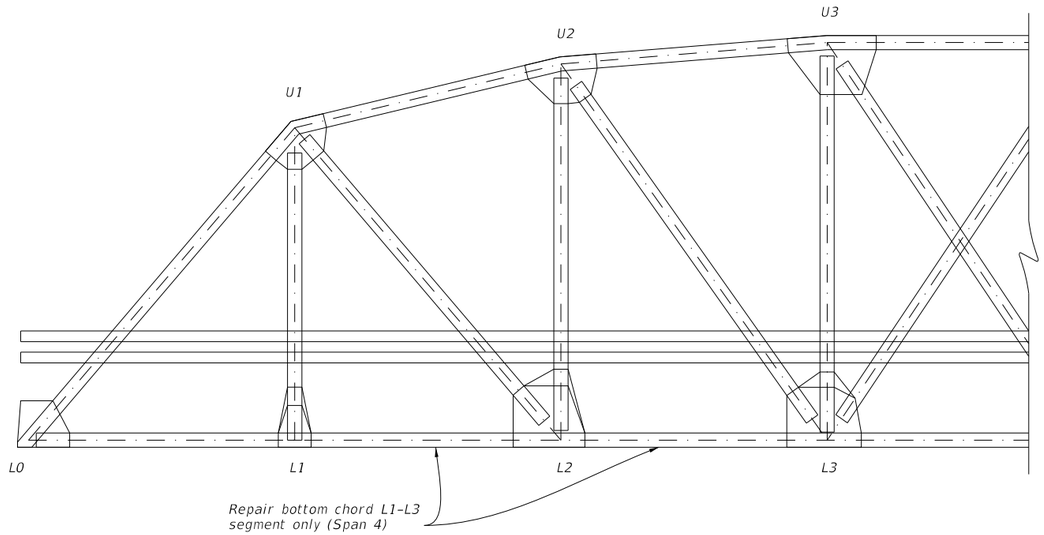


BOTTOM CHORD AT SPAN 3 (SOUTH) (L5-L6)

(Replace splice plate due to section loss)



FLANGE SECTION REPAIR



REPAIR BOTTOM CHORD LOCATIONS

FLANGE SECTION REPAIR PROCEDURE:

1. Clean in accordance with Item 0446, "General Preparation" and clean down to bare metal.
2. Place the plate over the portion of flange with section loss and weld as shown, in accordance with Item 0448, "Structural Field Welding". Do this to top side of the flange only.
3. Back weld the opposite side of repair plate where any existing material is removed to seal off the repair against mosture.

NOTE:

Photo shows the condition of the structure as of November, 2022. Condition may have changed. Field verify all repair locations and extents prior to beginning work.

Repair as shown in accordance with Item 0784, "Steel Member Repair". Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

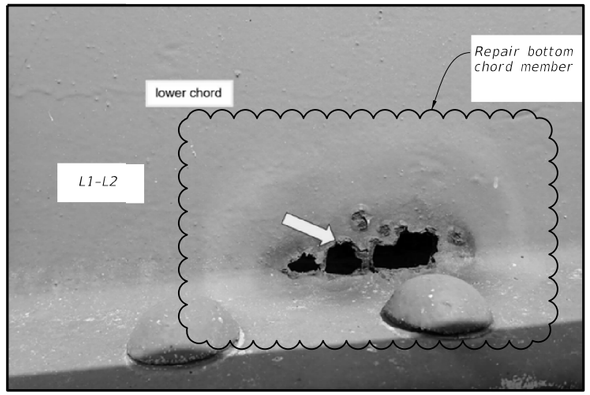
SHEET 2 OF 3

Texas Department of Transportation | Bridge Division

REPAIR NO. 4
TRUSS BOTTOM CHORD
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

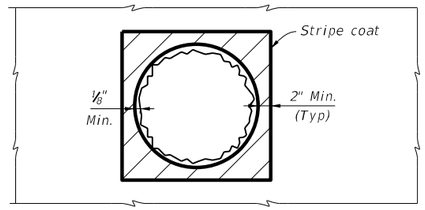
FILE: US0090_BRG_7707mi12.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST.	COUNTY		SHEET NO.
	YKM	COLORADO		91

DATE: 1/4/2024 4:45:10 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



BOTTOM CHORD AT SPAN 3 (SOUTH) (L1-L2)

(Repair bottom chord segment due to section loss)



CORROSION HOLE DETAIL

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

REPAIR PROCEDURE:

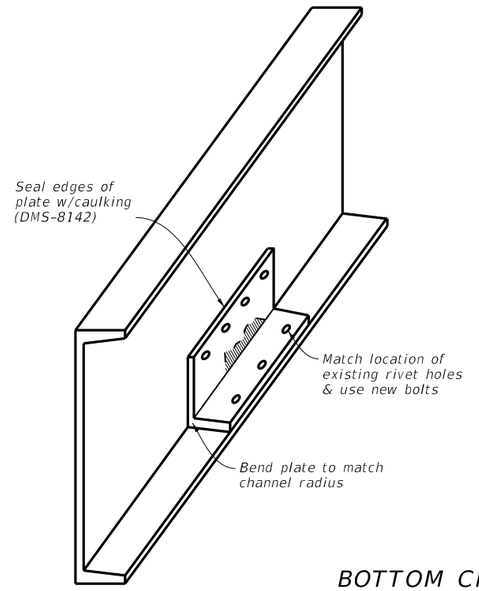
1. Keep minimum clear spacing of 1", between corrosion effected area and edge of hole.
2. Contractor may determine alternate size of plate based on section loss area. Larger plates may be used to repair multiple holes, but do not remove more web material than is necessary to clean the hole.
3. Drill corrosion holes using a drill bit up to ¼" larger than the nominal diameter of the corrosion hole. Ensure edges of holes are smooth. Clean and paint an area extending 2" minimum on all sides around the repair area on both sides (if accessible) and inside the hole. See Corrosion Hole Detail for more information.
4. Apply a stripe coat of paint to all areas repaired by hole drilling. Obtain approval from the Engineer before painting repair areas.
5. Install angle plate and secure with new ¾" bolts.
6. Apply caulking sealant around the perimeter (edges) of the angle plate DMS-8142.
7. Torches may not be used to create holes in members.

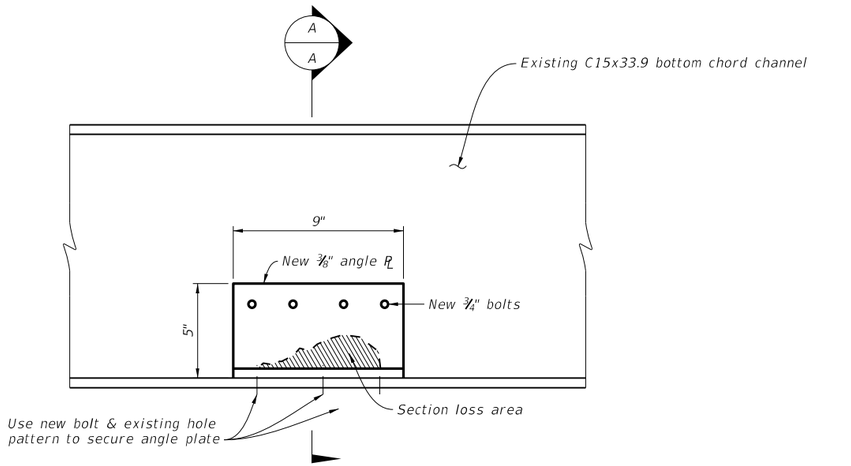
MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

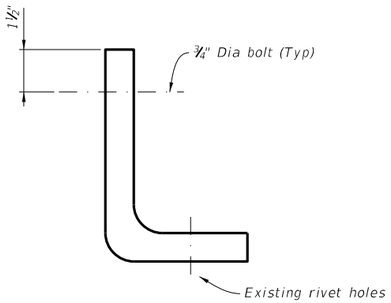
All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.





BOTTOM CHORD AT SPAN 3 (L1-L2)



SECTION A-A

SHEET 3 OF 3

Texas Department of Transportation — Bridge Division

REPAIR NO. 4
TRUSS BOTTOM CHORD

NBI: 13-045-0-0027-01-001

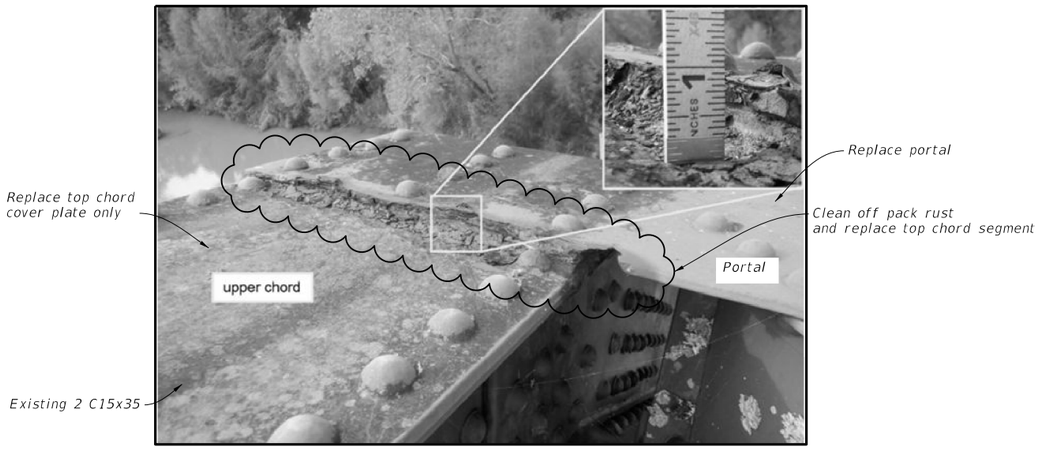
COLORADO RIVER BRIDGE REHABILITATION

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

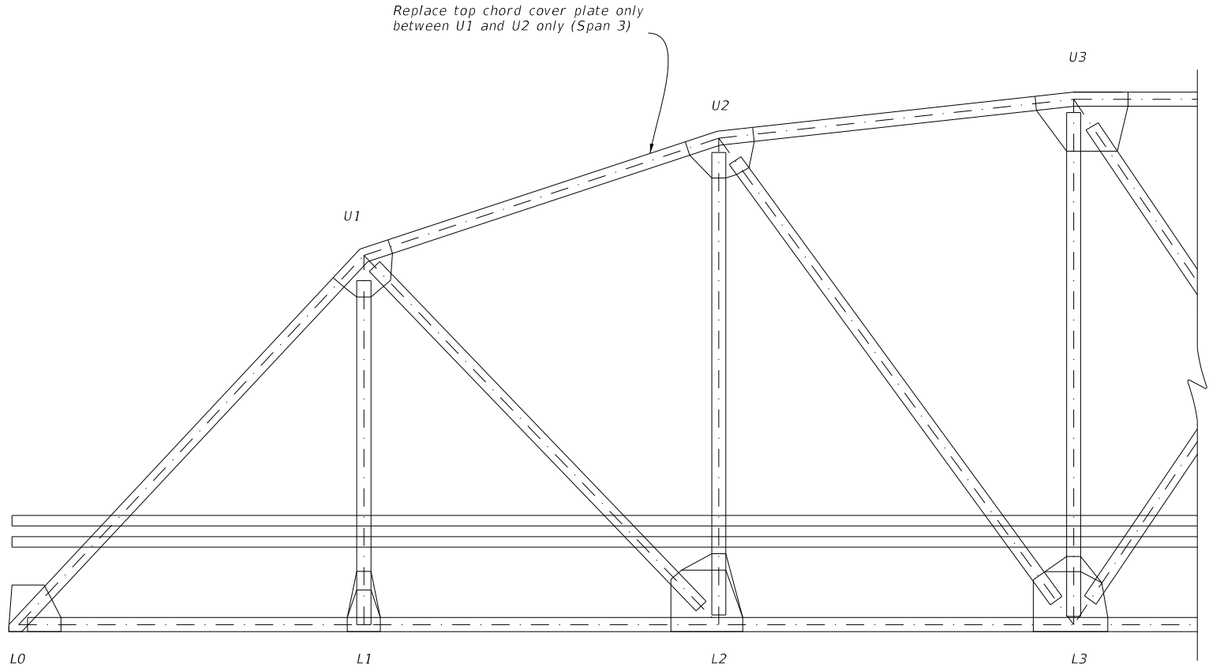
FILE: US0090_BRG_7707mi12.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		92

DATE: 1/4/2024 4:45:10 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn

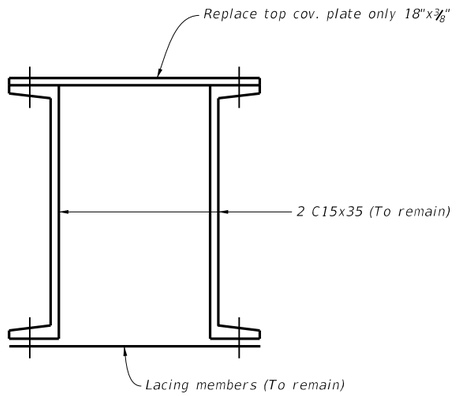


TOP CHORD SPAN 3 (SOUTH) (U1)

(Replace top chord cover plate between U1 and U2 only)



REPLACED TOP CHORD COVER PLATE LOCATIONS



NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

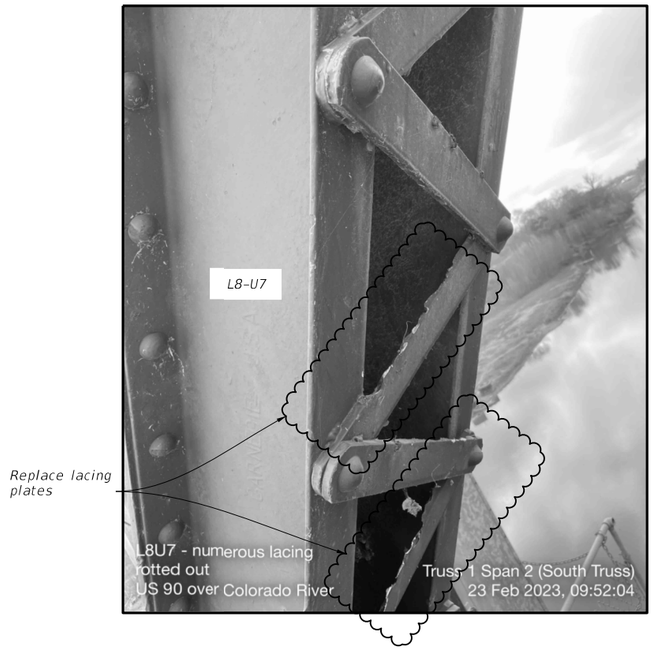
REPAIR NO. 5
TRUSS TOP CHORD

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

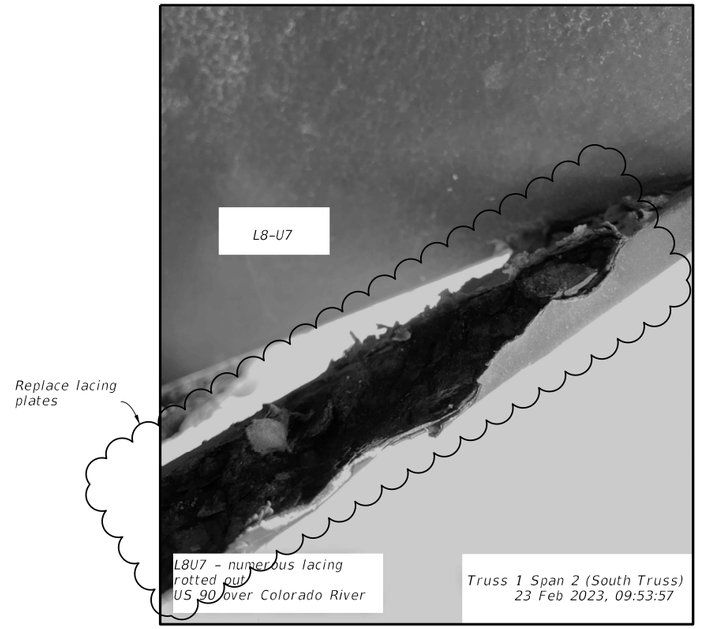
FILE: US0090_BRG_7707mi21.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		93

DATE: 1/4/2024 12:16:28 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT\Documents\BRG\Design\Detailing Practice\BRG BorderV8i.dgn



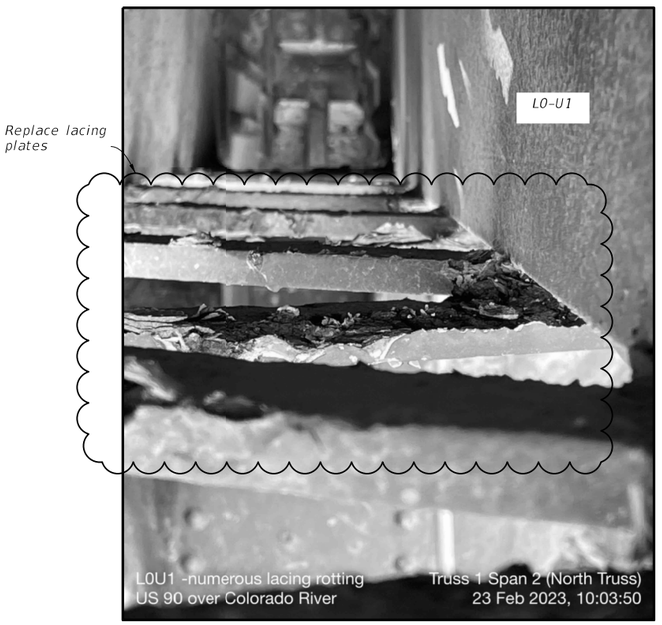
LACING PLATE AT SPAN 2 (SOUTH) (L8-U7)

(Replace all lacing plates on end posts for all truss spans)



LACING PLATE AT SPAN 2 (SOUTH) (L8-U7)

(Replace all lacing plates on end posts for all truss spans)



LACING PLATE AT SPAN 2 (NORTH) (L0-U1)

(Replace all lacing plates on end posts for all truss spans)

NOTE:

Estimate quantity of lacing plates replacement for spans 2 & 4 is 328 plates and for span 3 is 204 plates.

Replace all lacing members for all end posts.

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ⅞" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

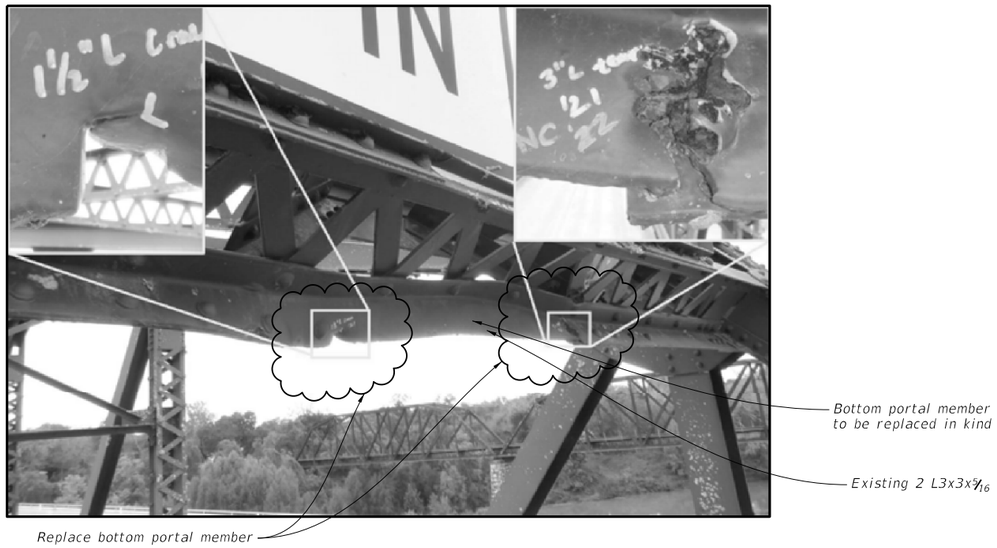
Texas Department of Transportation

Bridge Division

REPAIR NO. 6
TRUSS END POST
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

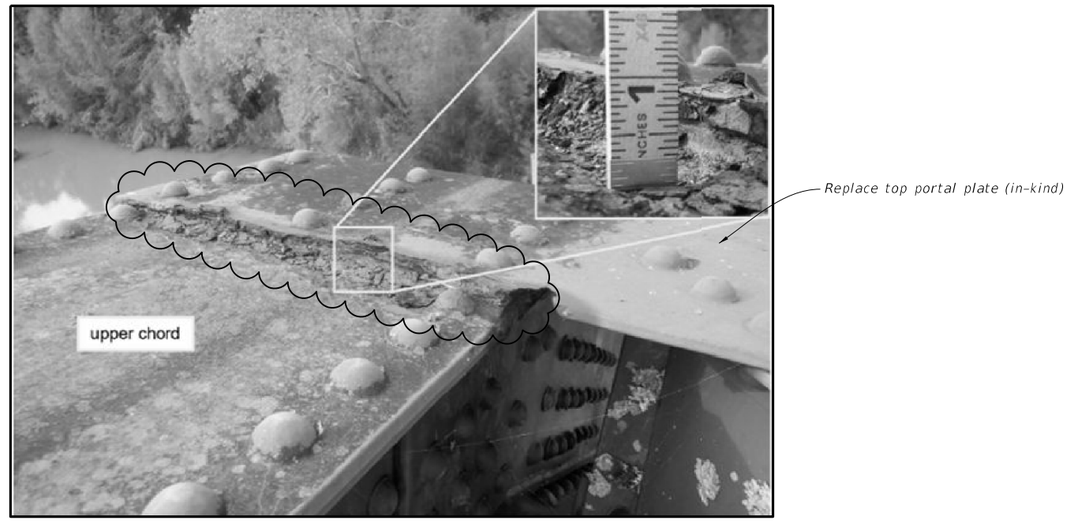
FILE: US0090_BRG_7707mi14.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		94

DATE: 12/18/2023 1:21:17 PM
FILE: pw:\\txdot.projectwiseonline.com\TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



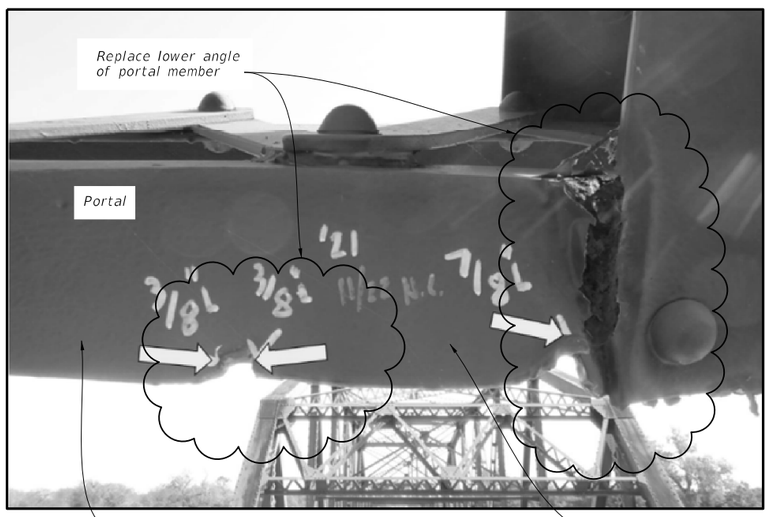
PORTAL MEMBER AT SPAN 4 (U7)

(Replace bottom portal member due to impact damage)



PORTAL MEMBER AT SPAN 3 (SOUTH) (U1)

(Replace top portal plate due to section loss)



PORTAL MEMBER AT SPAN 2 (U1)

(Replace bottom portal member due to impact damage)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ⅞" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

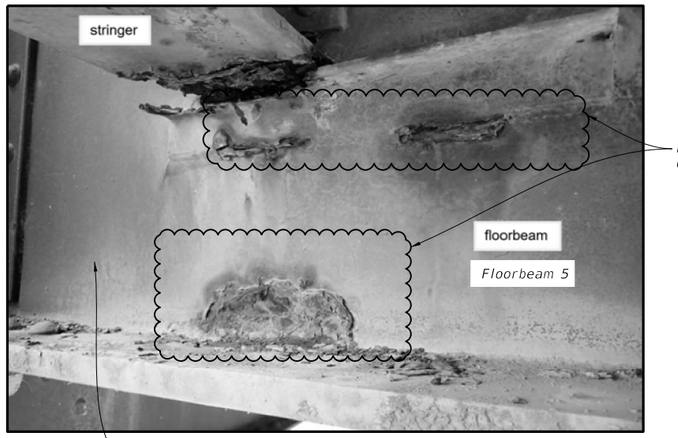
03/08/2024

Texas Department of Transportation — Bridge Division

REPAIR NO. 7
TRUSS PORTAL BRACE
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

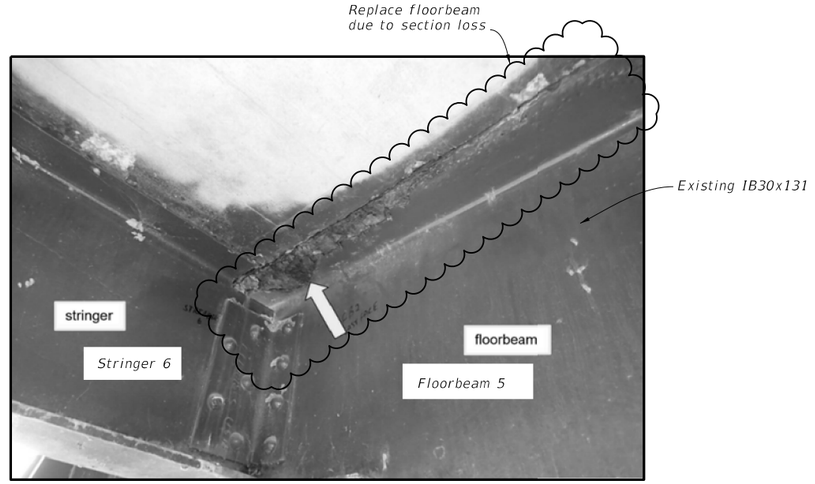
FILE: US0090_BRG_7707mi15.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		95

DATE: 12/19/2023 11:06:40 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010421\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



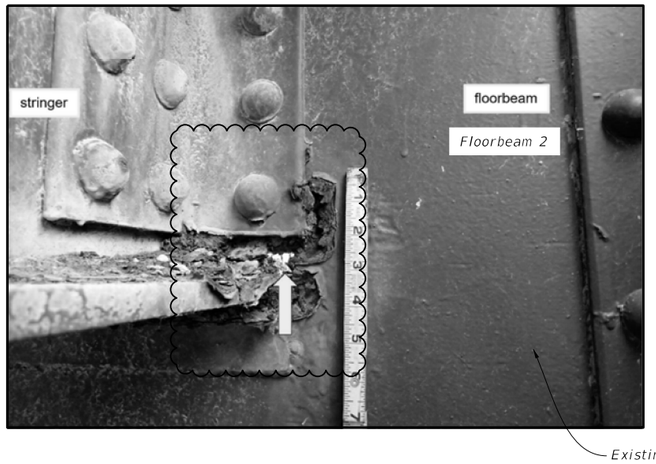
FLOORBEAM AT SPAN 3 (L5) (AT STRINGER 6)

(Replace floorbeam due to section loss)



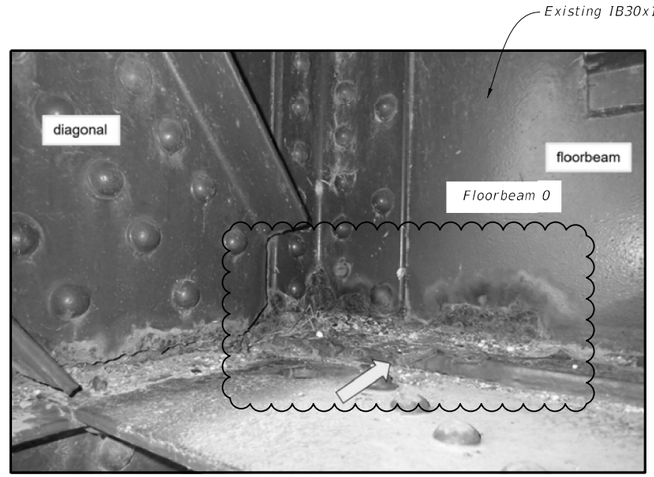
FLOORBEAM 2 AT SPAN 3 (L5) (AT STRINGER 6)

(Replace floorbeam due to section loss)



FLOORBEAM AT SPAN 2 (L2) (AT STRINGER 6)

(Replace floorbeam due to section loss)



FLOORBEAM AT SPAN 4 (L0) (SOUTH - DIAGONAL)

(Replace floorbeam due to section loss)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

In lieu of IB30x131, use W30x132 steel member.

In lieu of IB30x115, use W30x116 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ⅞" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

SHEET 1 OF 4

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

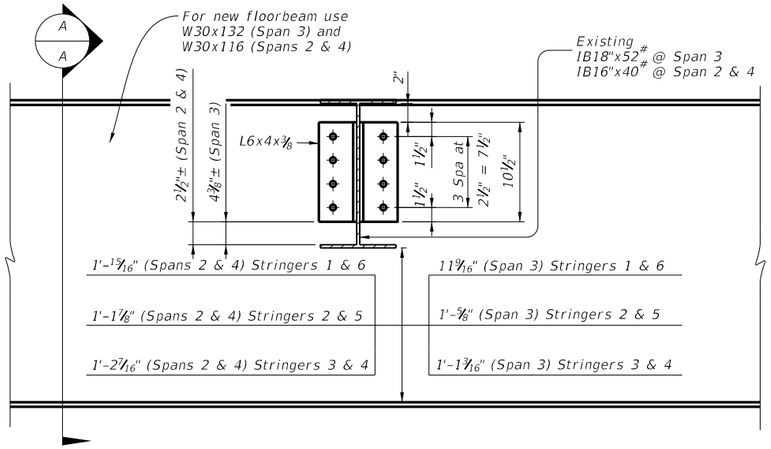
Texas Department of Transportation | Bridge Division

REPAIR NO. 8
TRUSS FLOORBEAM
NBI: 13-045-0-0027-01-001

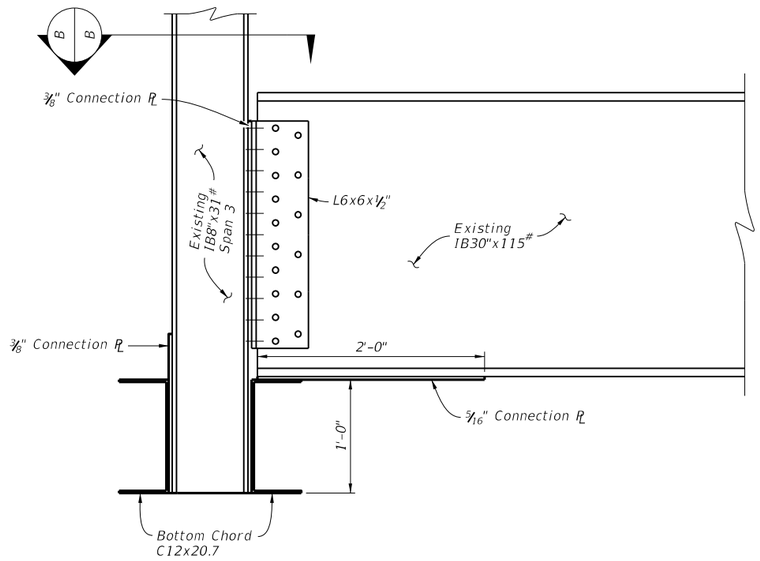
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi16.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		96

DATE: 12/19/2023 11:07:41 AM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn

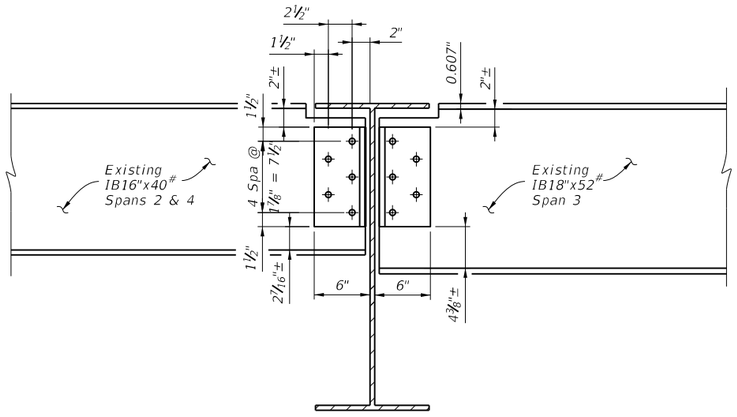


FLOORBEAM TO STRINGER

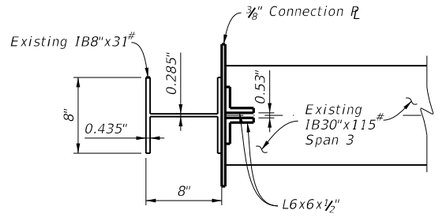


FLOORBEAM TO VERTICAL MEMBER @ L1 & L7

(SPAN 2 & 4)



SECTION A-A



SECTION B-B

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

DETAIL NOTES:

Connection details on following sheets shall be applied only on the areas that require attention. The remaining connection details have been provide in event of that additional areas require repair.

Field verify dimensions of existing components.

MATERIAL NOTES:

In lieu of IB30x131, use W30x132 steel member.

In lieu of IB30x115, use W30x116 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

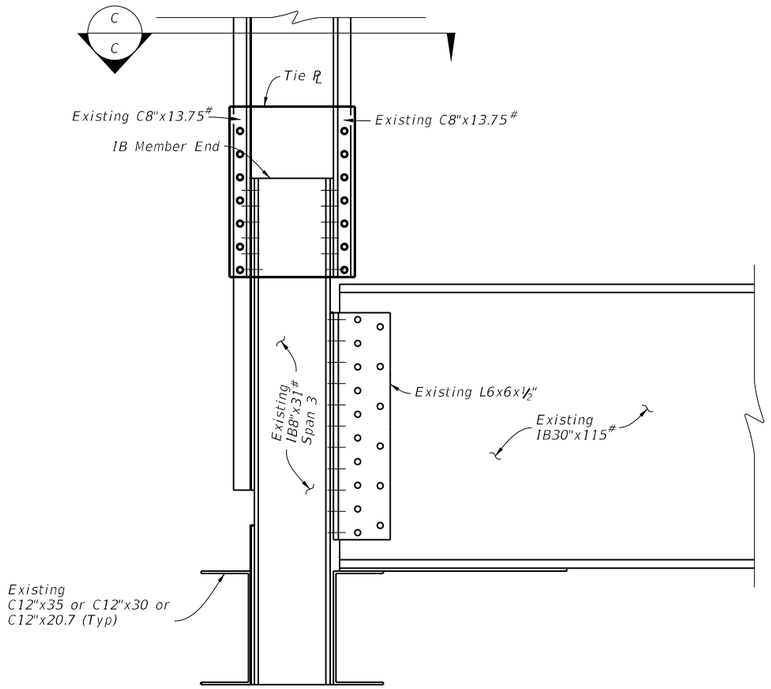
STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

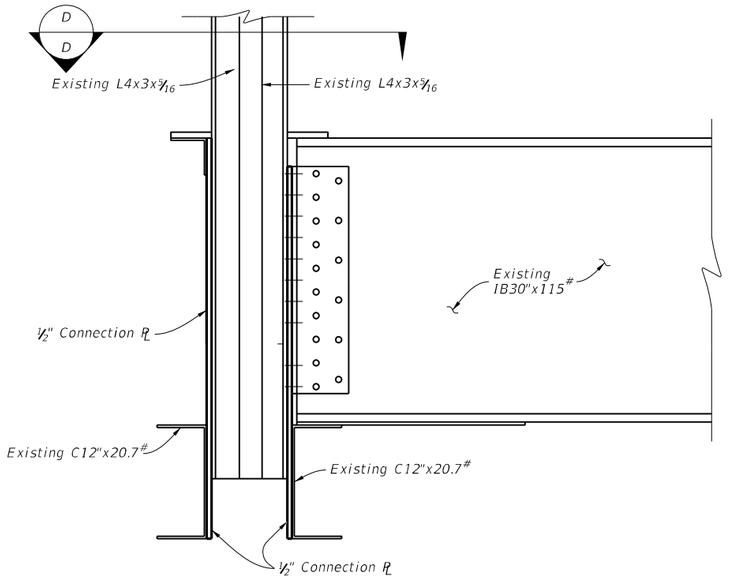
REPAIR NO. 8
TRUSS FLOORBEAM
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi16.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		97



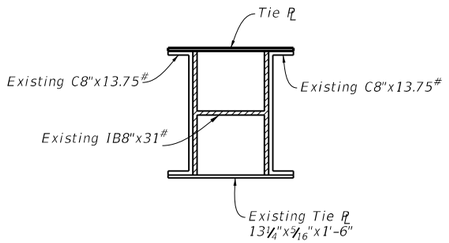
FLOORBEAM TO VERTICAL MEMBER @ L2 & L6

(SPAN 2 & 4)

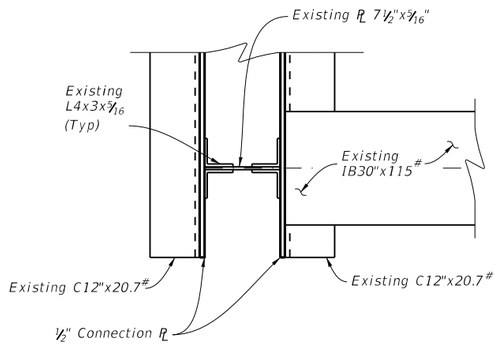


FLOORBEAM TO VERTICAL MEMBER @ L0 & L8

(SPAN 2 & 4)



SECTION C-C



SECTION D-D

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

DETAIL NOTES:

Connection details on following sheets shall be applied only on the areas that require attention. The remaining connection details have been provide in event of that additional areas require repair.

Field verify dimensions of existing components.

MATERIAL NOTES:

In lieu of IB30x131, use W30x132 steel member.

In lieu of IB30x115, use W30x116 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

SHEET 3 OF 4

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

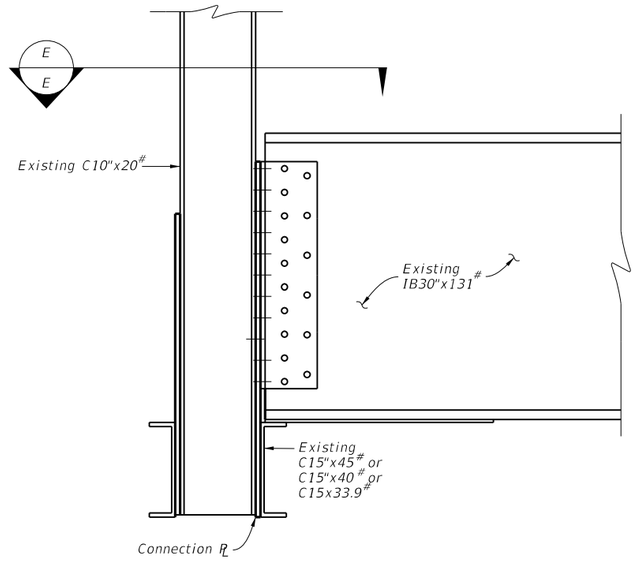
Texas Department of Transportation | Bridge Division

REPAIR NO. 8
TRUSS FLOORBEAM
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

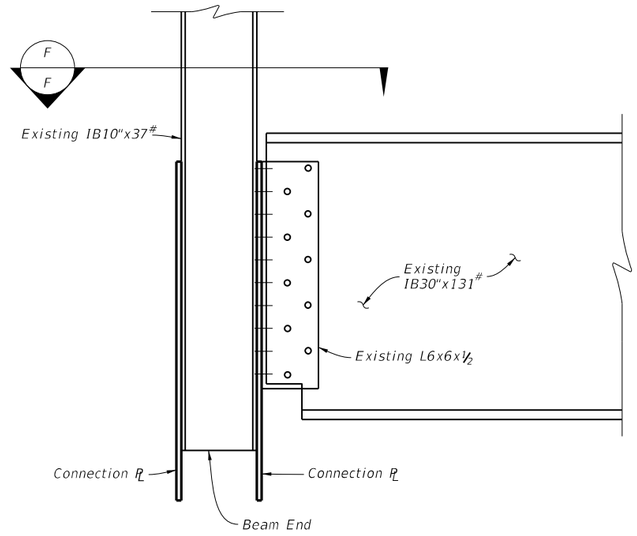
FILE: US0090_BRG_7707mi16.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		98

DATE: 12/19/2023 11:07:41 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



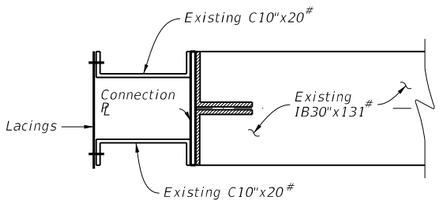
FLOORBEAM TO VERTICAL MEMBER @ L1 & L7

(SPAN 3)

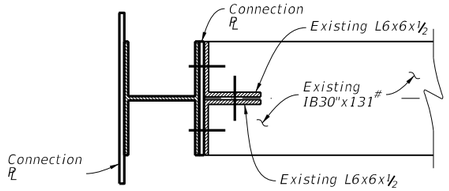


FLOORBEAM TO VERTICAL MEMBER @ L0 & L8

(SPAN 3)



SECTION E-E



SECTION F-F

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

DETAIL NOTES:

Connection details on following sheets shall be applied only on the areas that require attention. The remaining connection details have been provide in event of that additional areas require repair.

Field verify dimensions of existing components.

MATERIAL NOTES:

In lieu of IB30x131, use W30x132 steel member.

In lieu of IB30x115, use W30x116 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

SHEET 4 OF 4

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

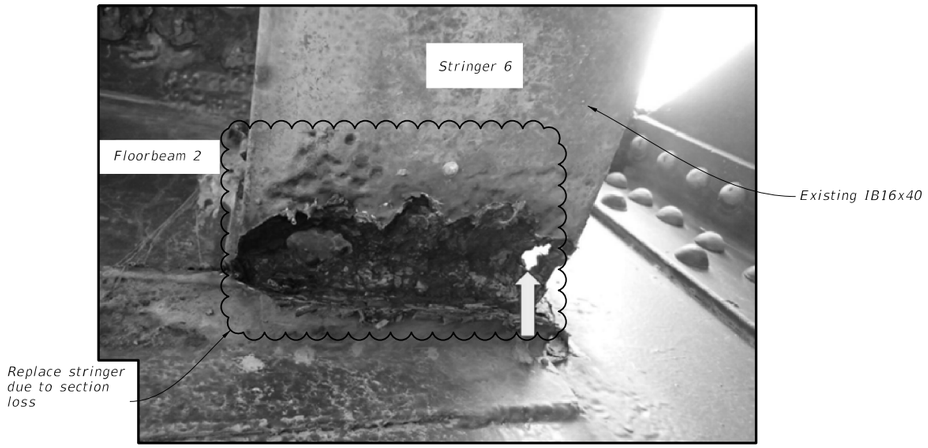
03/08/2024

Texas Department of Transportation | Bridge Division

REPAIR NO. 8
TRUSS FLOORBEAM
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

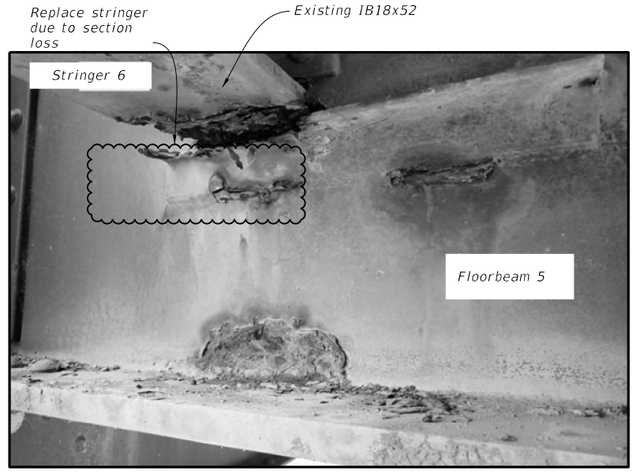
FILE: US0090_BRG_7707mi16.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		99

DATE: 12/19/2023 11:07:41 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\00270104\v4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



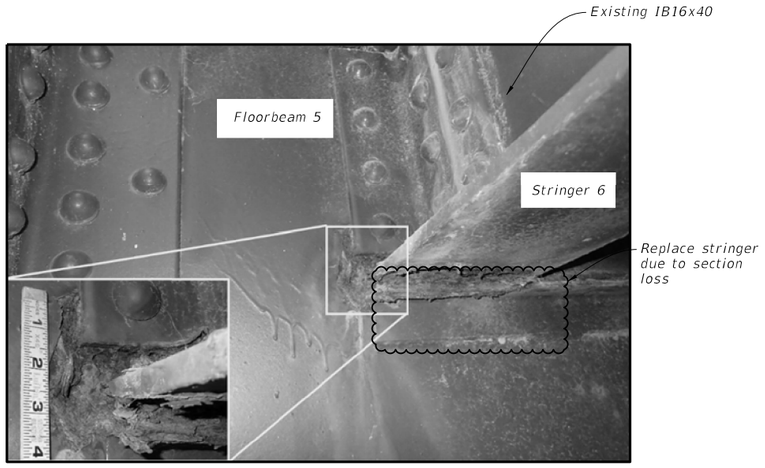
STRINGER 6 AT SPAN 2 (L2)

(Replace stringer due to section loss)



STRINGER 6 AT SPAN 3 (L5)

(Replace stringer due to section loss)



STRINGER 6 AT SPAN 4 (L5)

(Replace stringer due to section loss)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

In lieu of IB16x40, use W16x40 steel member.

In lieu of IB18x52, use W18x55 steel member.

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of Record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

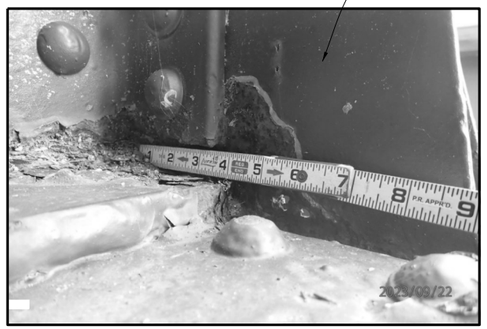
REPAIR NO. 9
TRUSS STRINGERS

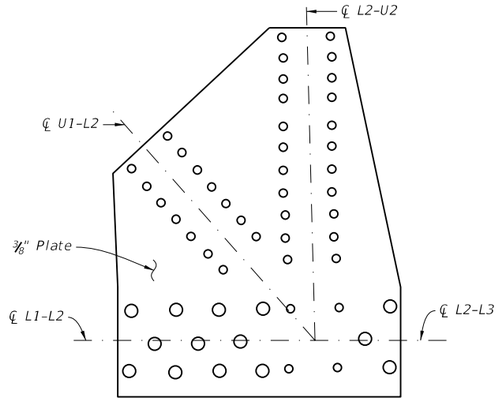
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

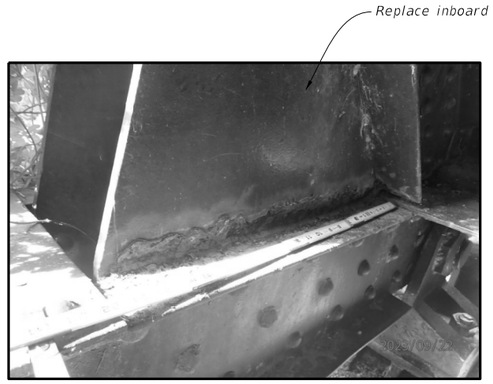
FILE: US0090_BRG_7707mi17.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		100

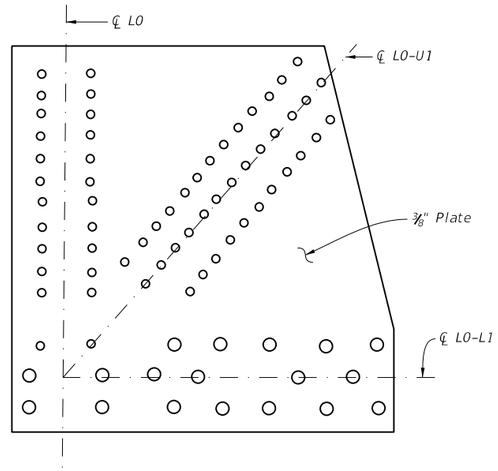
DATE: 12/19/2023 11:10:50 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



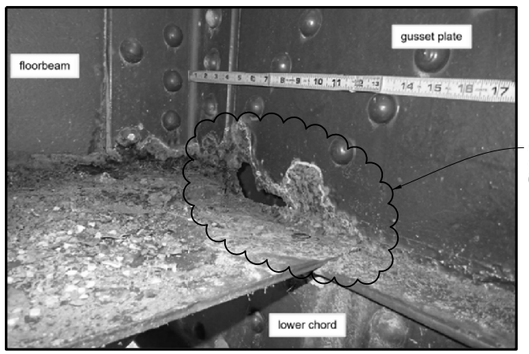


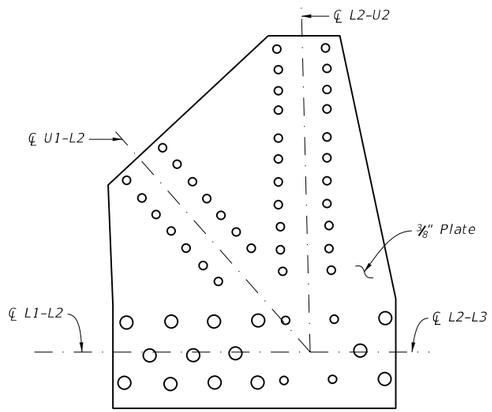
GUSSET PLATE AT SPAN 2 (NORTH) (L2)





GUSSET PLATE AT SPAN 2 (SOUTH) (L0)





GUSSET PLATE AT SPAN 2 (SOUTH) (L2)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ⅞" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of record of any inconsistencies.

SHEET 1 OF 6

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

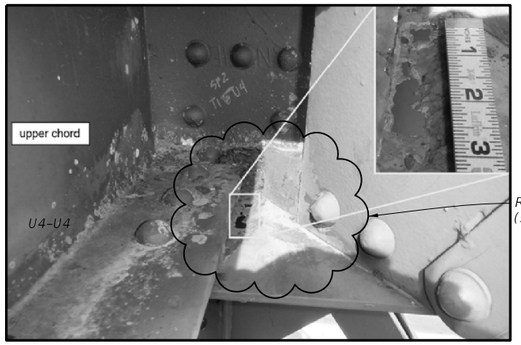
Texas Department of Transportation | Bridge Division

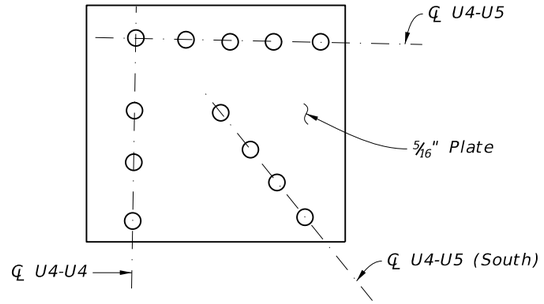
REPAIR NO. 10
TRUSS GUSSET PLATE
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

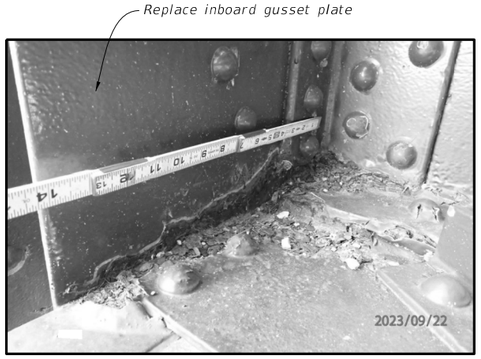
FILE: US0090_BRG_7707mi18.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		101

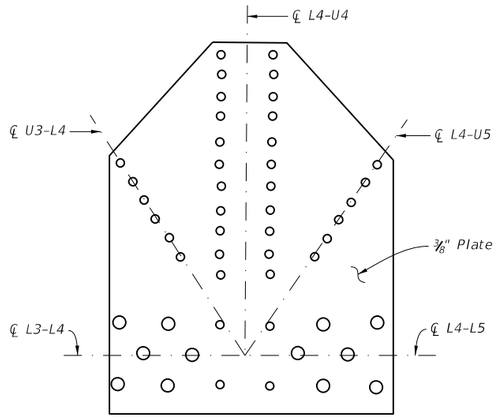
DATE: 1/2/2024 3:48:56 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7- Bridge\US0090_BRG_7707mi18.dgn



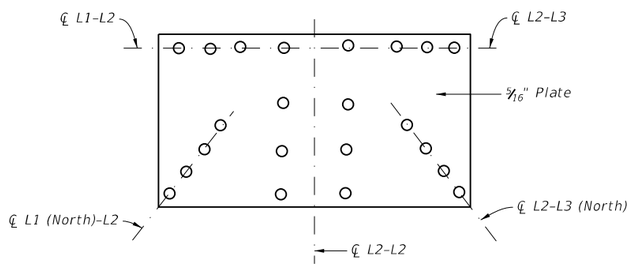


CONNECTION PLATE AT SPAN 2 (NORTH) (U4)





GUSSET PLATE AT SPAN 2 (NORTH) (L4)



CONNECTION PLATE AT SPAN 2 (SOUTH) (L2)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be 7/8" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

SHEET 2 OF 6

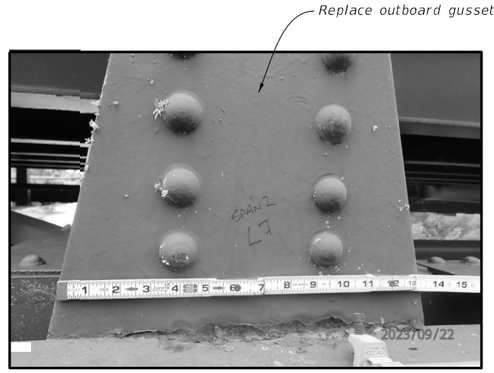
Texas Department of Transportation | Bridge Division

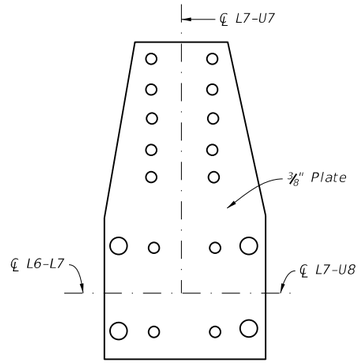
REPAIR NO. 10
TRUSS GUSSET PLATE
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

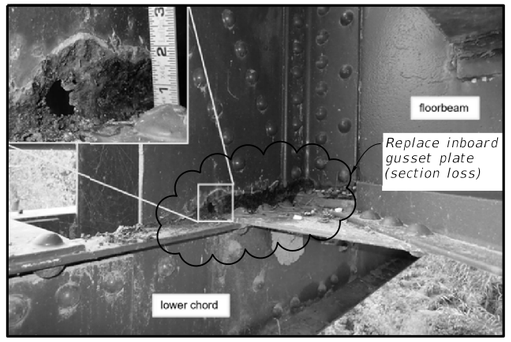
FILE: US0090_BRG_7707mi18.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		102

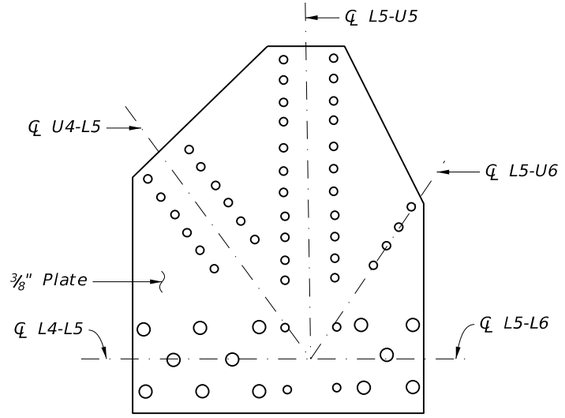
DATE: 1/2/2024 3:48:56 PM
FILE: pw:\txdot.projectwiseonline.com\TxDOT4\Documents\13 - YKM\Design Projects\0027010421\4 - Design\Plan Set\7- Bridge\US0090_BRG_7707mi18.dgn



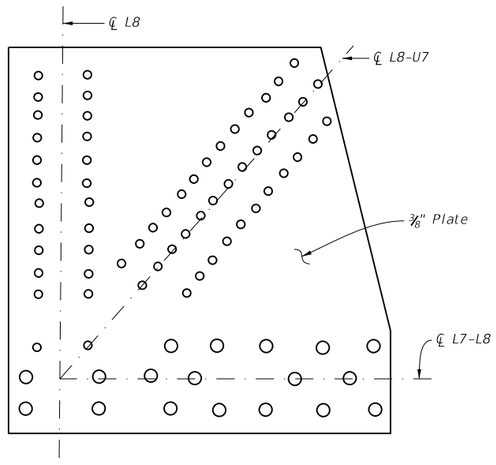


GUSSET PLATE AT SPAN 2 (NORTH) (L7)





GUSSET PLATE AT SPAN 2 (SOUTH) (L5)



GUSSET PLATE AT SPAN 2 (SOUTH) (L8)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ⅞" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

SHEET 3 OF 6

Texas Department of Transportation | Bridge Division

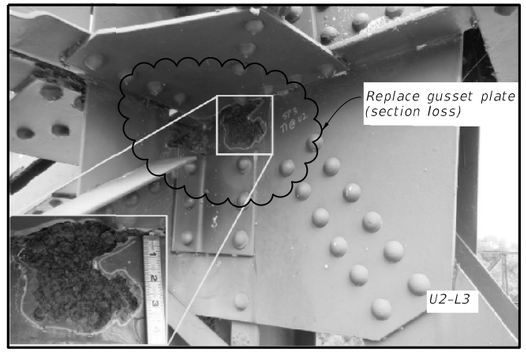
REPAIR NO. 10
TRUSS GUSSET PLATE

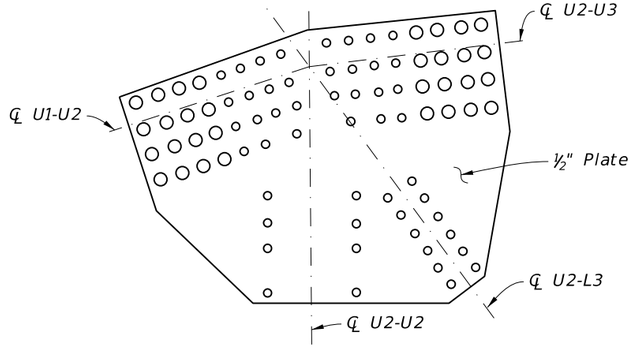
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

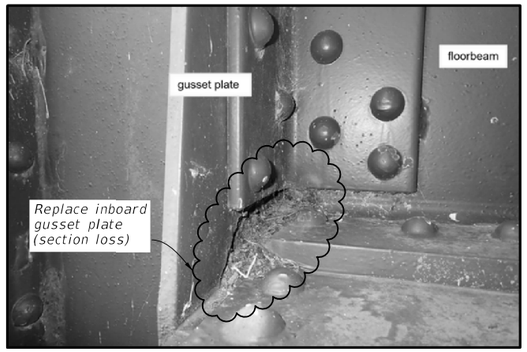
FILE: US0090_BRG_7707mi18.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		103

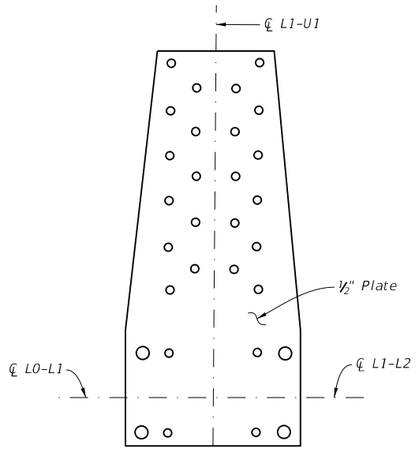
DATE: 1/2/2024 3:48:56 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010042\4 - Design\Plan Set\7 Bridge\US0090_BRG_7707mi18.dgn



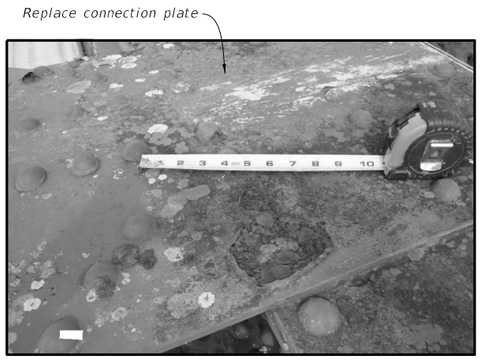


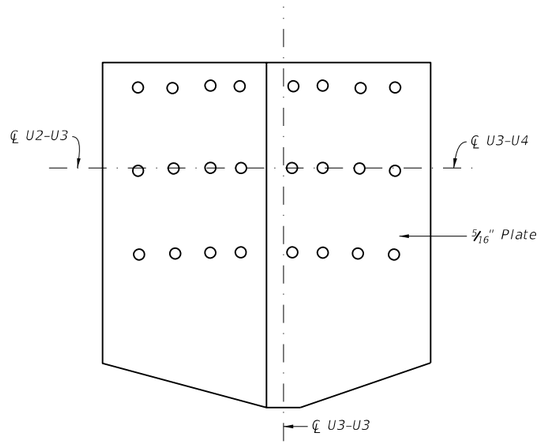
GUSSET PLATE AT SPAN 3 (NORTH) (U2)





GUSSET PLATE AT SPAN 3 (NORTH) (L1)





TOP CONNECTION PLATE AT SPAN 3 (NORTH) (U3)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be ¾" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of record of any inconsistencies.

SHEET 4 OF 6

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

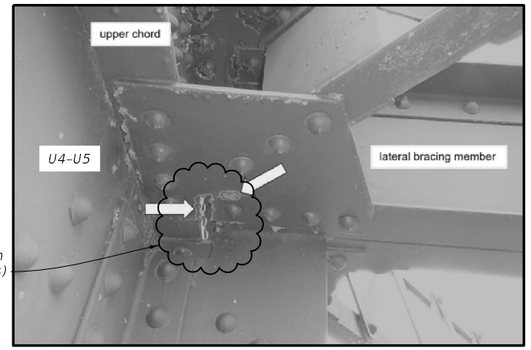
Texas Department of Transportation | Bridge Division

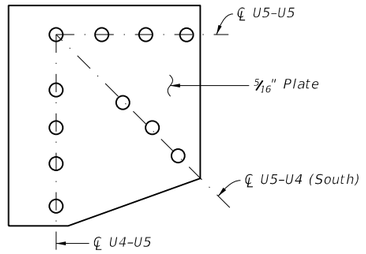
REPAIR NO. 10
TRUSS GUSSET PLATE
NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

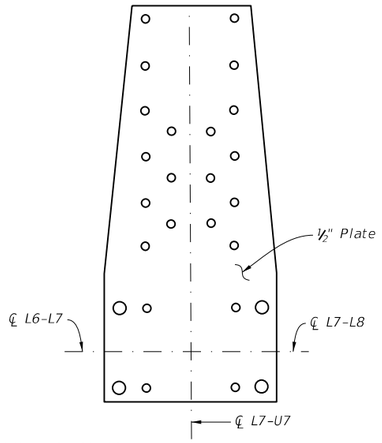
FILE: US0090_BRG_7707mi18.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		104

DATE: 1/2/2024 3:48:56 PM
FILE: pw:\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\00270104Z\4 - Design\Plan Set\7- Bridge\US0090_BRG_7707mi18.dgn

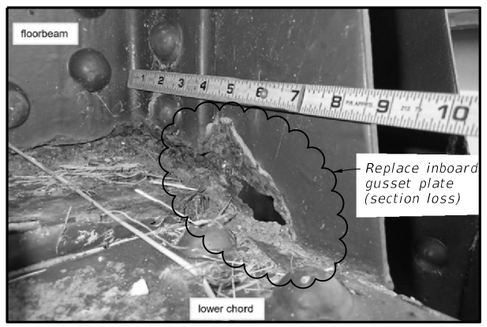


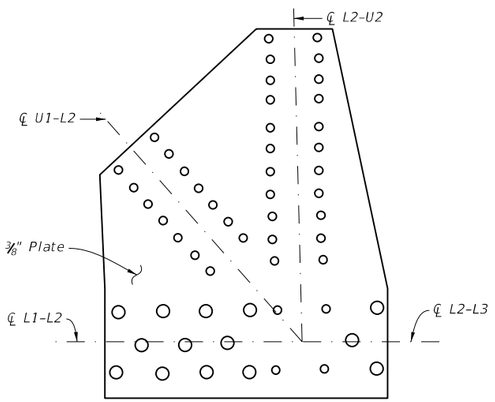


CONNECTION PLATE AT SPAN 3 (NORTH) (U5)



GUSSET PLATE AT SPAN 3 (SOUTH) (L7)





GUSSET PLATE AT SPAN 4 (NORTH) (L2)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be 3/4" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of record of any inconsistencies.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

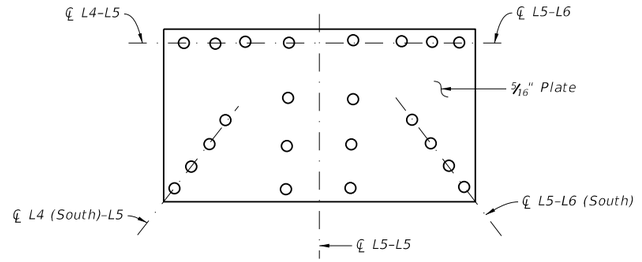
SHEET 5 OF 6

Texas Department of Transportation | Bridge Division

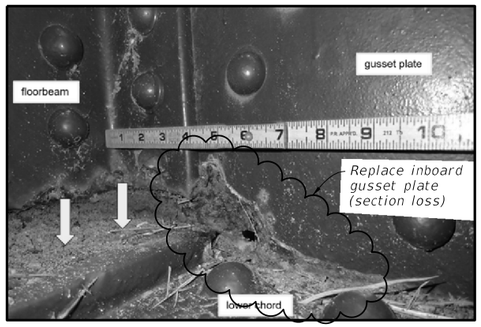
REPAIR NO. 10
TRUSS GUSSET PLATE
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

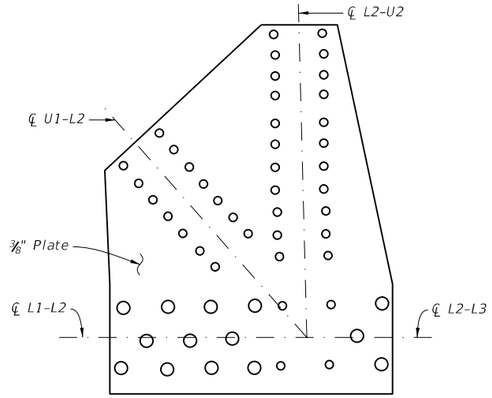
FILE: US0090_BRG_7707mi18.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		105

DATE: 1/2/2024 3:48:56 PM
FILE: pw:\\xdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi18.dgn

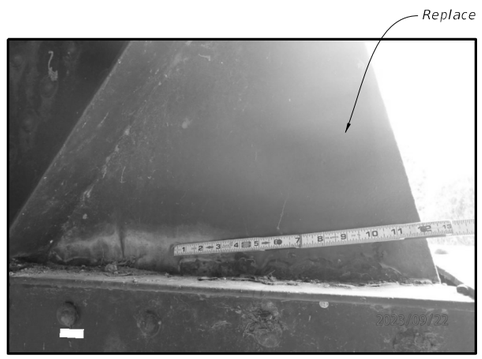


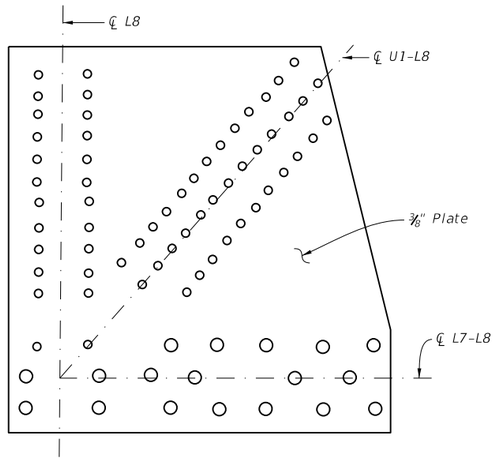
CONNECTION PLATE AT SPAN 4 (NORTH) (L5)





GUSSET PLATE AT SPAN 4 (SOUTH) (L2)





GUSSET PLATE AT SPAN 4 (SOUTH) (L8)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

MATERIAL NOTES:

Provide structural steel to meet requirements of ASTM A709 Grade 50.

All bolts shall be 7/8" dia (unless otherwise noted) and shall conform to ASTM F3125 Grade F1852.

Contractor shall field verify all members and inform Engineer of record of any inconsistencies.

SHEET 6 OF 6

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

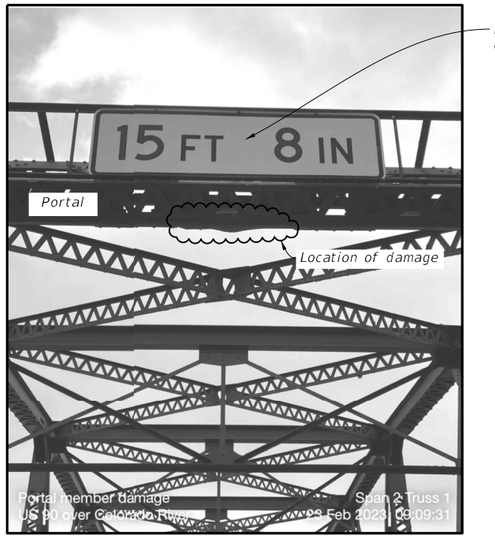
03/08/2024

Texas Department of Transportation | Bridge Division

REPAIR NO. 10
TRUSS GUSSET PLATE
NBI: 13-045-0-0027-01-001
COLORADO RIVER BRIDGE REHABILITATION

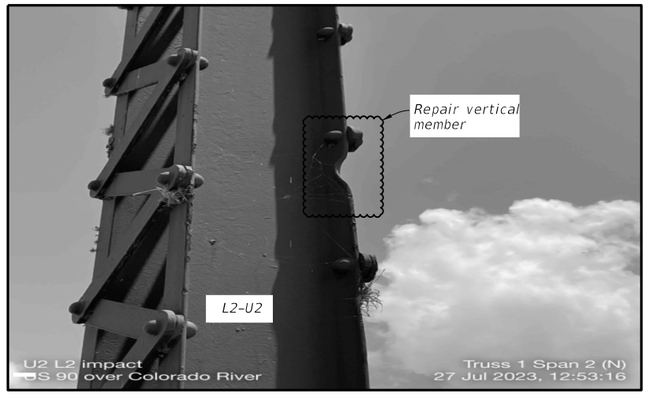
FILE: US0090_BRG_7707mi18.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		106

DATE: 1/2/2024 3:48:56 PM
FILE: pw:\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi18.dgn



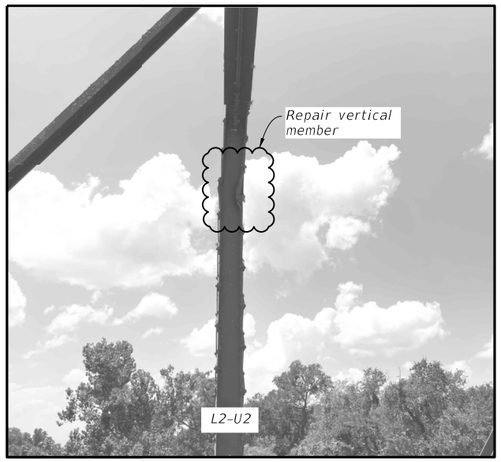
PORTAL MEMBER AT SPAN 2 (U1)

(Approximate Length – 24" of repair)



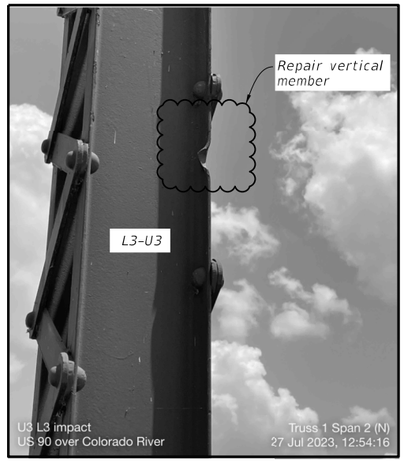
VERTICAL MEMBER AT SPAN 2 (NORTH) (L2-U2)

(Repair vertical due to impact damage – 3" long)



VERTICAL MEMBER AT SPAN 2 (SOUTH) (L2-U2)

(Repair vertical due to impact damage – 1' long)



VERTICAL MEMBER AT SPAN 2 (NORTH) (L3-U3)

(Repair vertical due to impact damage – 3" long)

(1) Cost of new vertical clearance sign shall be paid under Item 0636 6009 "REPLACE EXISTING ALUMINUM SIGNS (TY O)" type W12-2a. The new vertical clearance dimension (height) to be determined by contractor upon completion of the rehabilitation of truss.

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/15/2024

SHEET 1 OF 4

Texas Department of Transportation — Bridge Division

REPAIR NO. 11 TRUSS HEAT STRAIGHTENING

NBI: 13-045-0-0027-01-001

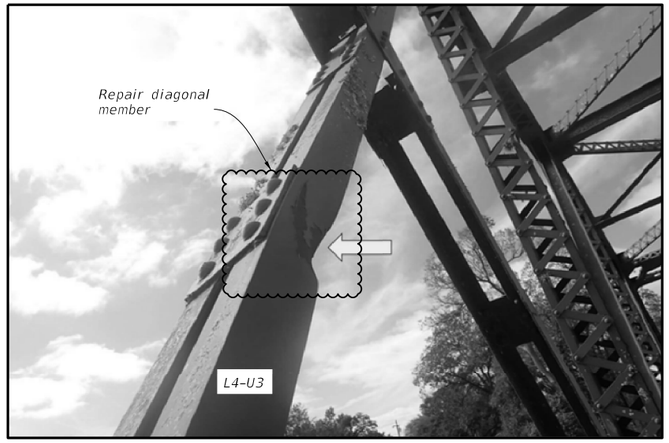
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi19.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		107

DATE: 12/22/2023 3:52:25 PM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn

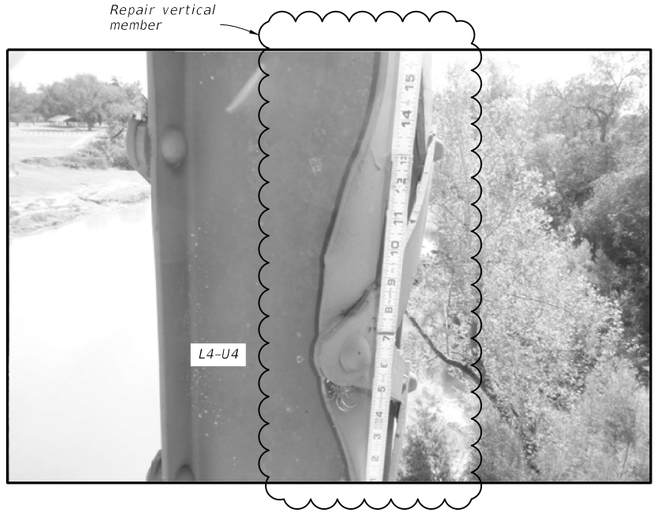
VERTICAL MEMBER AT SPAN 2 (SOUTH) (L3-U3)

(Repair vertical due to impact damage – 2' long)



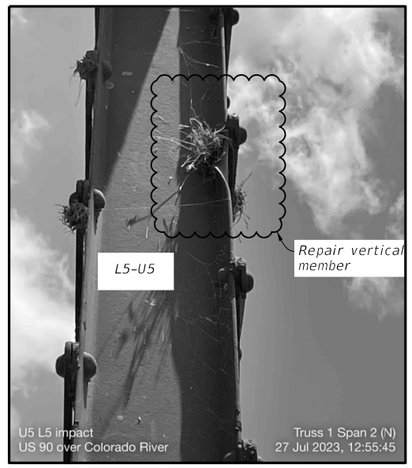
DIAGONAL MEMBER AT SPAN 2 (SOUTH) (L4-U3)

(Repair diagonal due to impact damage – 2' long)



VERTICAL MEMBER AT SPAN 2 (SOUTH) (L4-U4)

(Repair vertical due to impact damage – 3' long)



VERTICAL MEMBER AT SPAN 2 (NORTH) (L5-U5)

(Repair vertical due to impact damage – 3" long)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

SHEET 2 OF 4

Texas Department of Transportation

Bridge Division

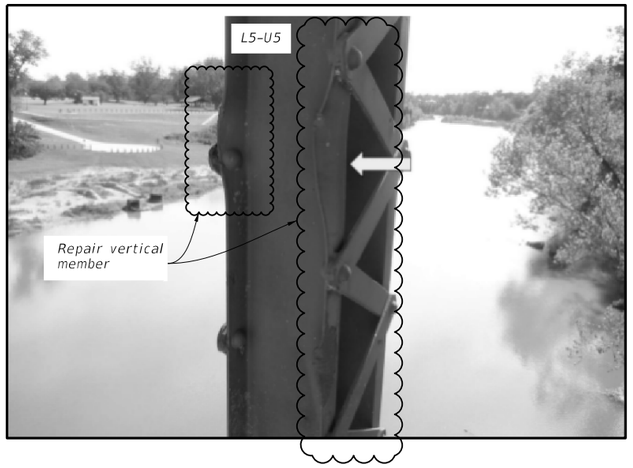
REPAIR NO. 11 TRUSS HEAT STRAIGHTENING

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

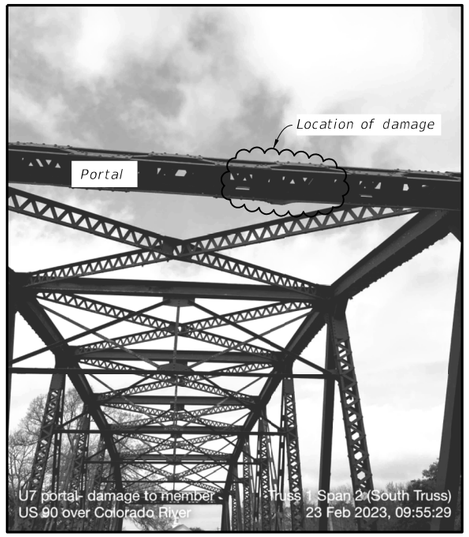
FILE: US0090_BRG_7707mi19.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		108

DATE: 12/22/2023 3:52:25 PM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



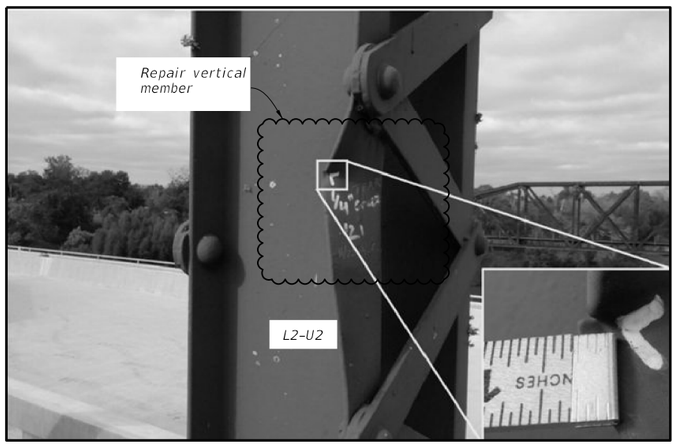
VERTICAL MEMBER AT SPAN 2 (SOUTH) (L5-U5)

(Repair vertical due to impact damage – 2' long)



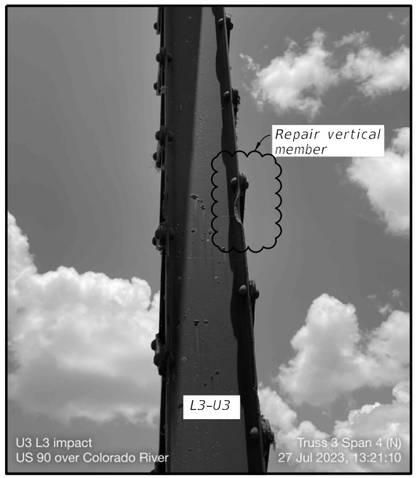
PORTAL MEMBER AT SPAN 2 (U7)

(Approximate Length – 24" of repair)



VERTICAL MEMBER AT SPAN 4 (NORTH) (L2-U2)

(Repair vertical due to impact damage)



VERTICAL MEMBER AT SPAN 4 (NORTH) (L3-U3,

(Repair vertical due to impact damage – 3" long)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

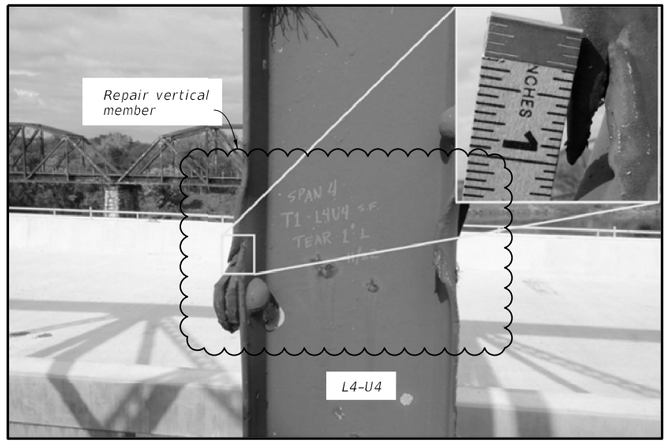
REPAIR NO. 11 TRUSS HEAT STRAIGHTENING

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

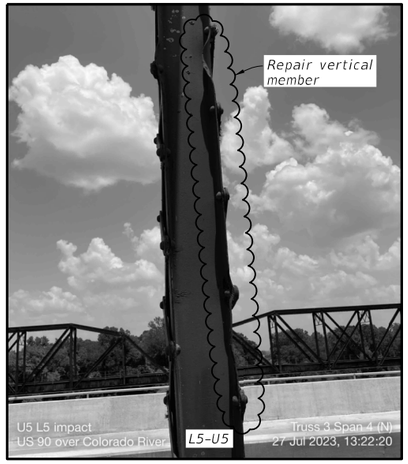
FILE: US0090_BRG_7707mi19.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		109

DATE: 12/22/2023 3:52:25 PM
FILE: pw:\\txdot-projectwiseonline.com\TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



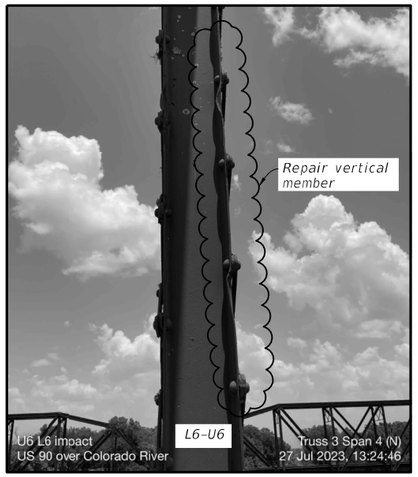
VERTICAL MEMBER AT SPAN 4 (NORTH) (L4-U4)

(Repair vertical due to impact damage – 1' long)



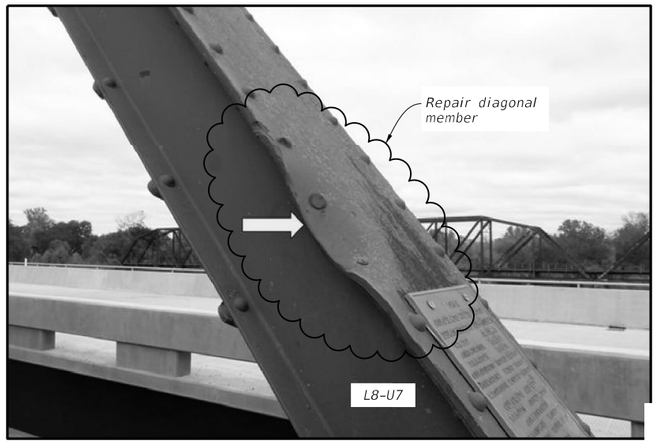
VERTICAL MEMBER AT SPAN 4 (NORTH) (L5-U5)

(Repair vertical due to impact damage – 6" long)



VERTICAL MEMBER AT SPAN 4 (NORTH) (L6-U6)

(Repair vertical due to impact damage – 2' long)



DIAGONAL MEMBER AT SPAN 4 (NORTH) (L8-U7)

(Repair diagonal due to impact damage – 2' long)

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

Texas Department of Transportation | Bridge Division

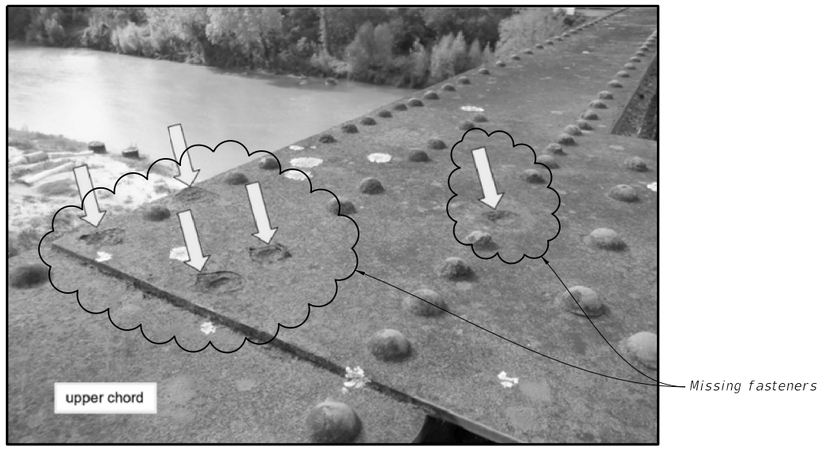
REPAIR NO. 11 TRUSS HEAT STRAIGHTENING

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

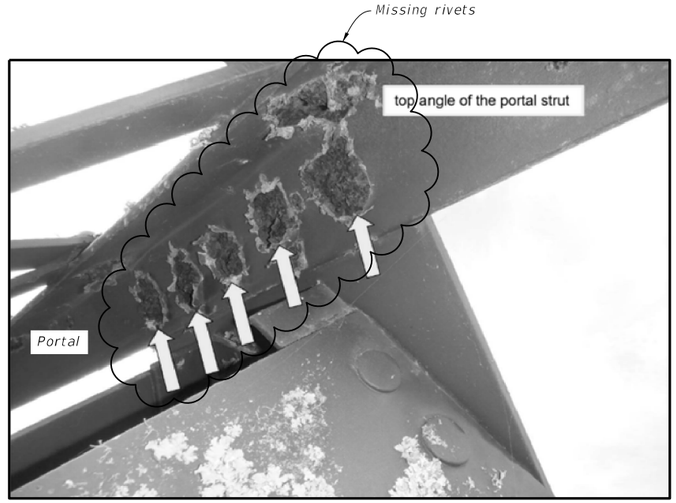
FILE: US0090_BRG_7707mi19.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		110

DATE: 12/22/2023 3:52:25 PM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



MISSING FASTENERS SPAN 3 (SOUTH) (U4)

(Replace missing, damaged rivets for all trusses)



TOP PORTAL STRUT SPAN 3 (SOUTH) (U1)

(Replace missing rivets)

NOTES:

Repair as shown in accordance with Item 0784, "Steel Member Repair".

Prior to beginning work, submit a procedure for removing rivets and provide a demonstration of the method to the Engineer for approval. Methods which an damage structural integrity will not be approved.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation | Bridge Division

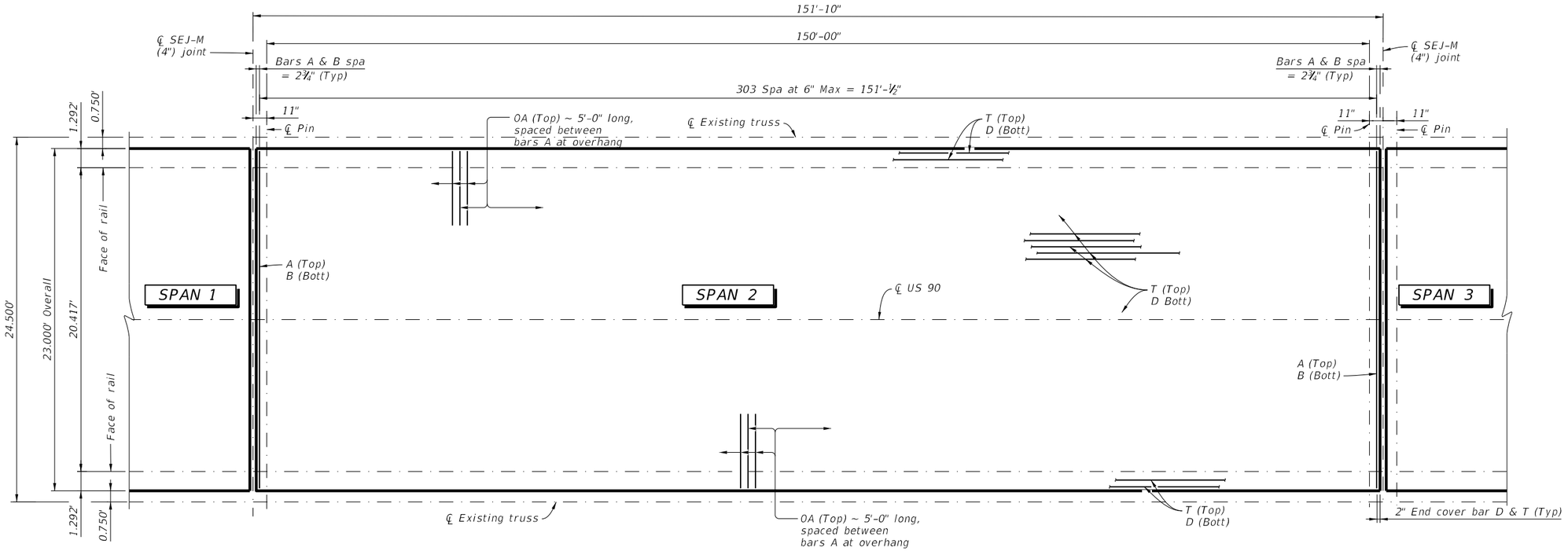
REPAIR NO. 12
REPLACE RIVET/BOLT

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

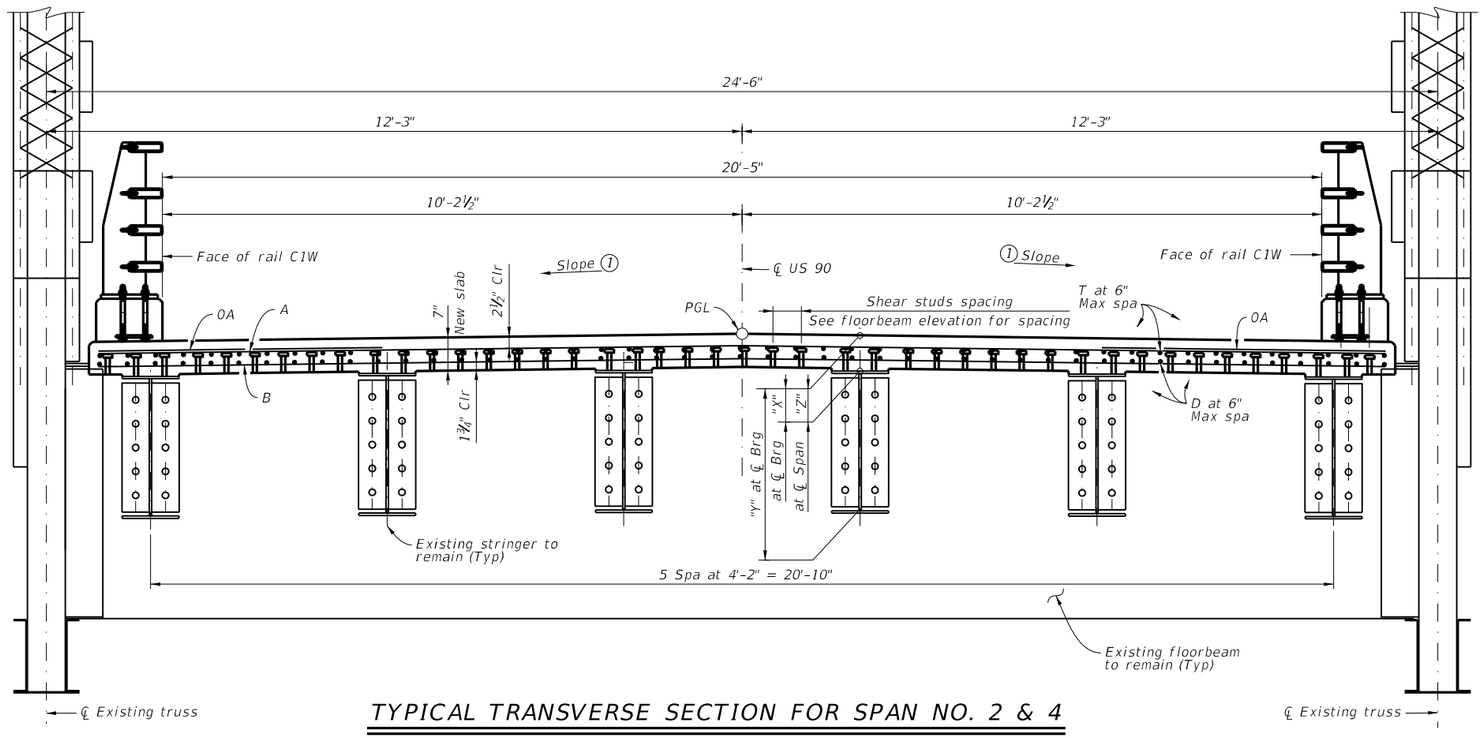
FILE: US0090_BRG_7707mi20.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU	
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0027	01	042	US 90	
	DIST	COUNTY		SHEET NO.	
	YKM	COLORADO		111	

DATE: 12/19/2023 11:12:02 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi09.dgn



TYPICAL PLAN FOR SPAN NO. 2 & 4

(Span 2 shown, Span 4 similar)



TYPICAL TRANSVERSE SECTION FOR SPAN NO. 2 & 4

① Slope to match approach and depart roadway slope

SHEET 1 OF 4

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

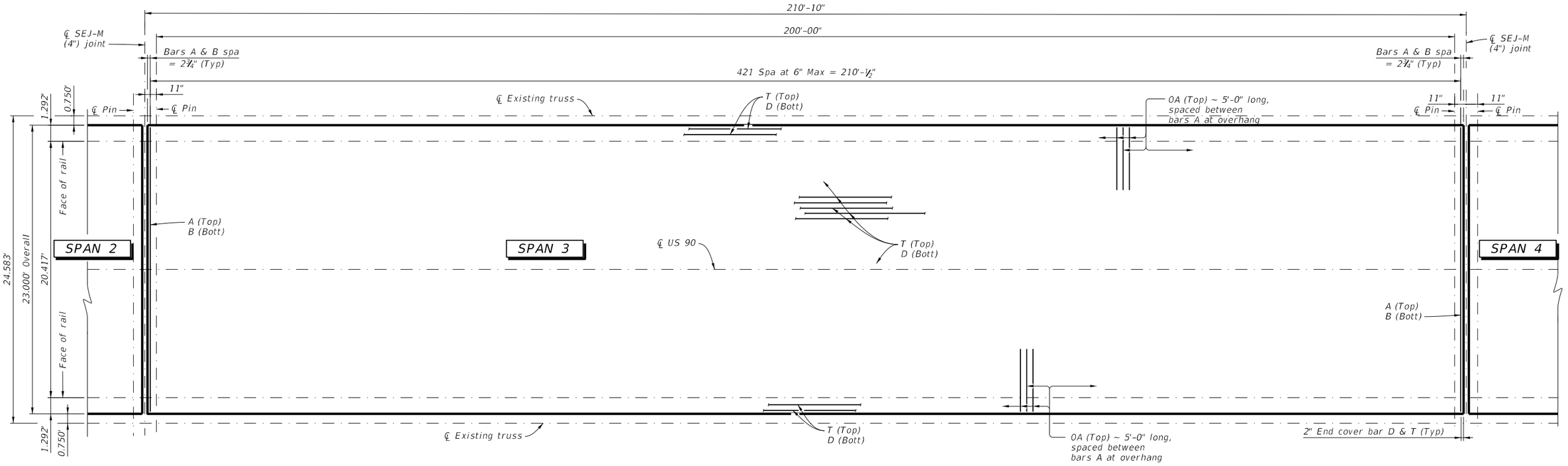
TRUSS SPAN REDECKING DETAILS

NBI: 13-045-0-0027-01-001

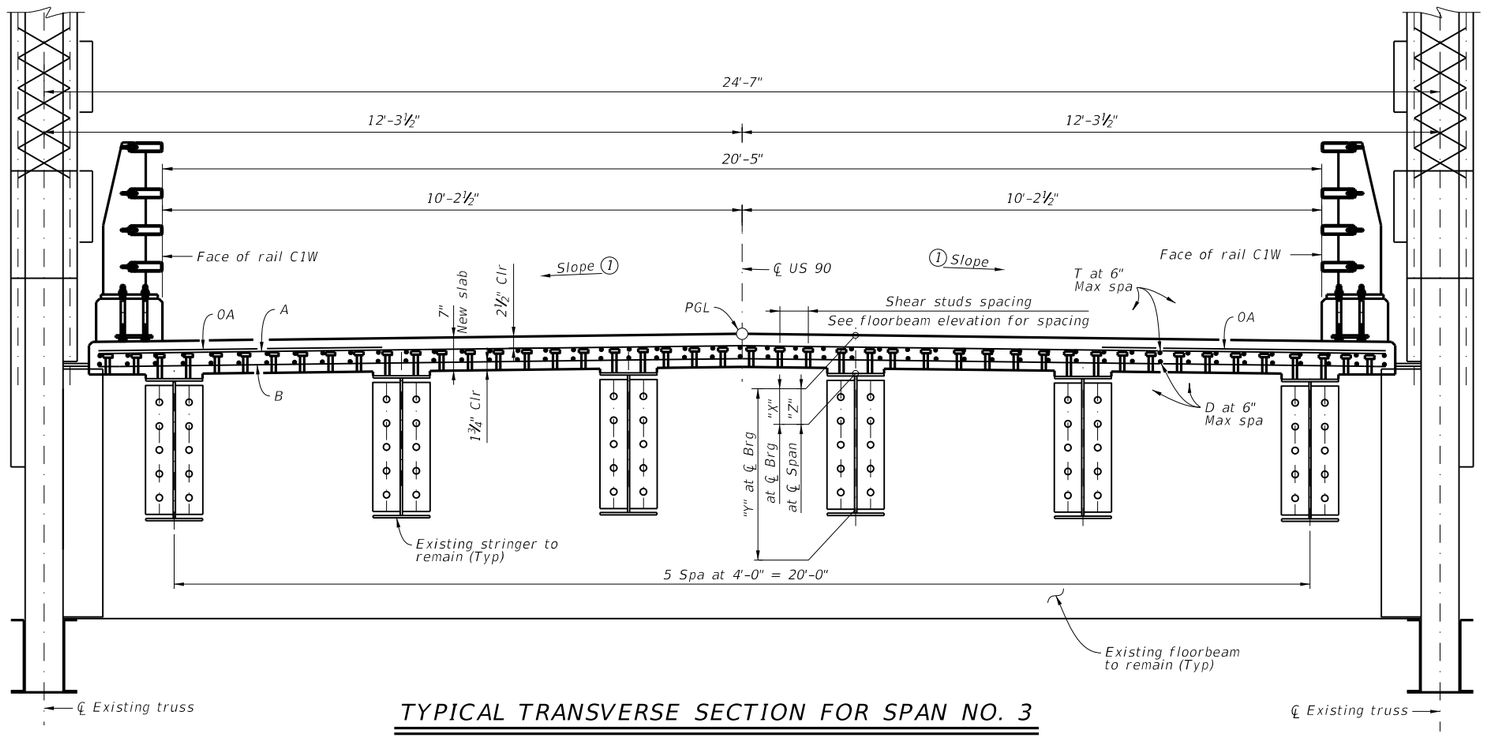
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi22.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		112

DATE: 12/19/2023 11:13:40 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi22.dgn



TYPICAL PLAN FOR SPAN NO. 3



TYPICAL TRANSVERSE SECTION FOR SPAN NO. 3

① Slope to match approach and depart roadway slope

SHEET 2 OF 4

ZORAN UMICEVIC
136921
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

03/08/2024

Texas Department of Transportation — Bridge Division

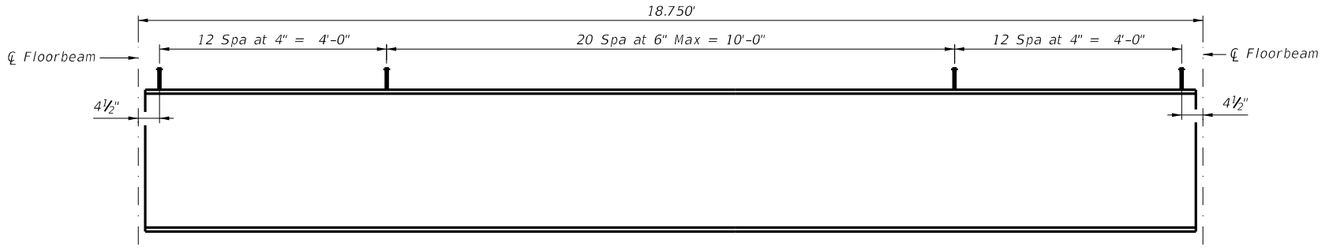
TRUSS SPAN REDECKING DETAILS

NBI: 13-045-0-0027-01-001

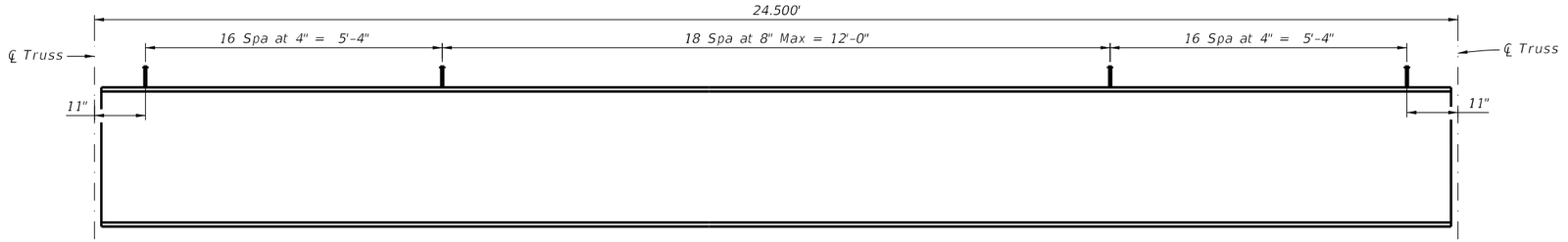
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi22.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		113

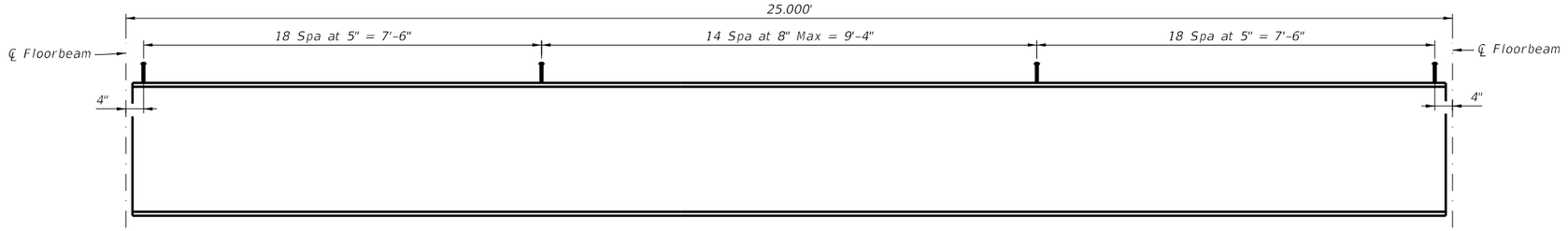
DATE: 12/19/2023 11:13:40 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010421\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi22.dgn



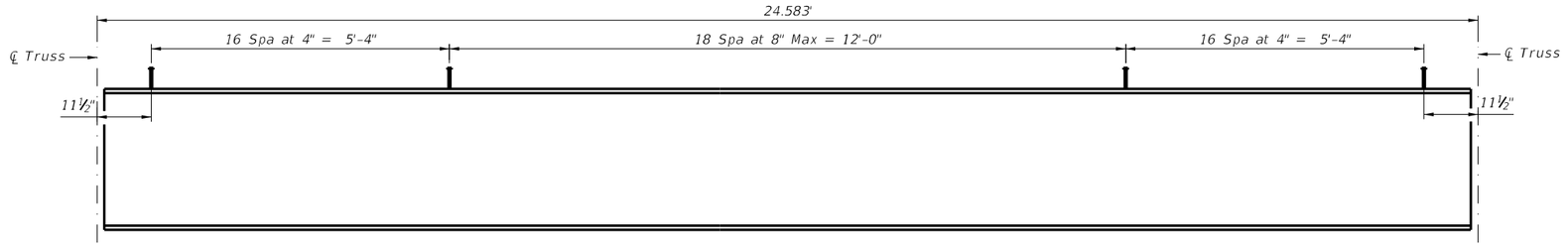
SPAN 2 OR 4 STRINGER



SPAN 2 OR 4 FLOORBEAM



SPAN 3 STRINGER



SPAN 3 FLOORBEAM

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

SHEET 3 OF 4

Texas Department of Transportation

Bridge Division

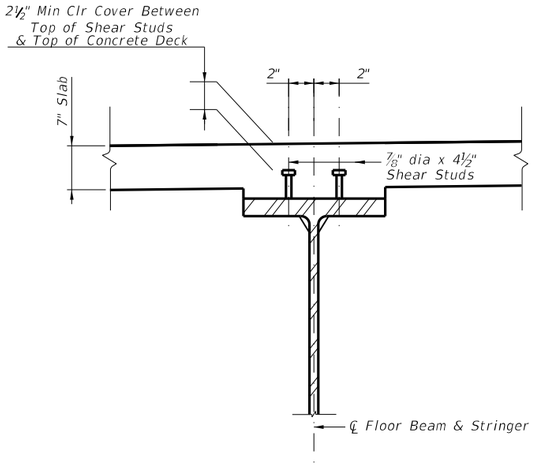
TRUSS SPAN REDECKING DETAILS

NBI: 13-045-0-0027-01-001

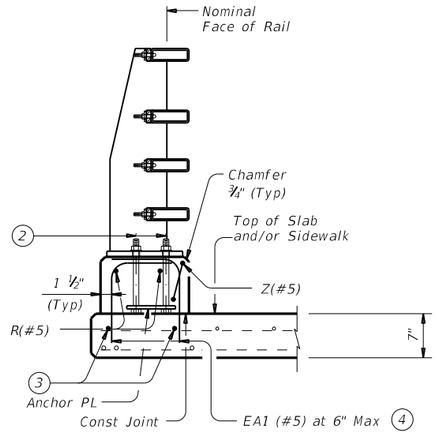
COLORADO RIVER BRIDGE REHABILITATION

FILE: US0090_BRG_7707mi22.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU			
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0027	01	042	US 90			
	DIST	COUNTY		SHEET NO.			
	YKM	COLORADO		114			

DATE: 12/19/2023 11:13:40 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\002701042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi22.dgn

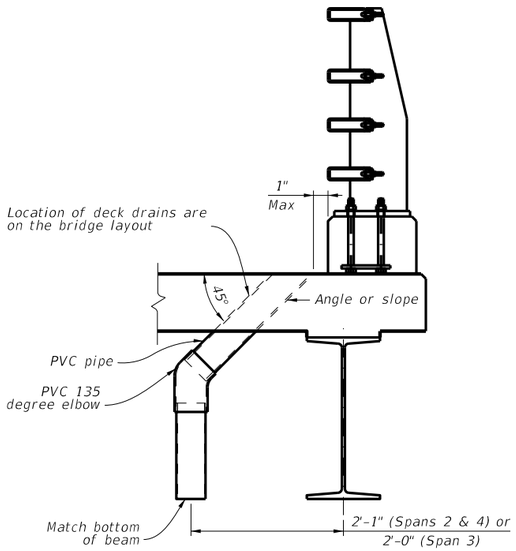


SHEAR STUD DETAIL



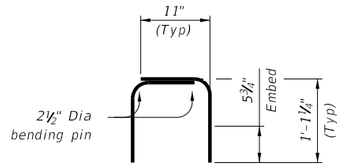
OPTIONAL RAIL ANCHORAGE DETAIL ON BRIDGE SLAB

(At the contractor's option and at no additional cost replace bar V shown on C1W standard with bars EA1)



DECK DRAIN DETAILS

Roughen outside of PVC to ensure bond with cast-in-place concrete.



BARS EA1 (#5)

Showing one complete bar.

(2) ℄ 7#8" Dia Anchor Bolts. See "Anchor Bolt Assembly Details" in C1W standards.

(3) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(4) Use drill equipped with depth gauge stop device to keep from drilling through bottom of slab. If hole extends through to bottom of slab, plug bottom of hole prior to placing adhesive anchorage system. Do not drill substutute hole next to drill through hole. Embed EA1(#5) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5¾".

Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(5) Reinforcing steel weight is calculated using an approximate factor of 5.4 lbs per sq ft.

(6) All replacement floorbeams and stringers shall have same camber values as existing members. Upon removal of existing members, contractor shall measure existing camber and utilize it for fabrication of new members.

BAR TABLE	
BAR	SIZE
A	#5
B	#5
D	#4
0A	#5
T	#4

TABLE OF ESTIMATED QUANTITIES

Span No.	Reinf Conc Slab	Total Reinf Steel
	SF	Lb
2	3493	8034
3	4643	10679
4	3493	8034
Total	11629	26747 (5)

TABLE OF SECTION DEPTHS

Span No.	Stringer No.	"X" at ℄ Brg.	"Y" at ℄ Brg.	"Z" at ℄ Span
2	1-6	8"	2'	(6)
3	1-6	7 ½"	2' - 1 ½"	
4	1-6	8"	2'	

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated - #4 = 1'-7"
Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, B, D, 0A, or T unless noted otherwise.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Jan 2023).
See Steel Beam Thickened Slab End (SBTS) standard sheet for thickened slab end details and quantity adjustments.
See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments.
See Type C1W rail details for rail anchorage in slab.
Concrete posts for existing rail, concrete bump-out, and reset of existing rail channels shall be paid under Item 0778 6024 "Concrete Post Replacement".
Concrete bump out for new posts shall be paid under new concrete slab Item 0422 6001.
Reseting existing rail channels shall be paid under Item 0778 6076 "Concrete Rail Replacement".
Contractor shall readjust steel reinforement in all directions, in order to fit around newly installed shear studs.

Cover dimensions are clear dimensions, unless noted otherwise.

STATE OF TEXAS
ZORAN UMICEVIC
136921
LICENSED
PROFESSIONAL ENGINEER

03/08/2024

Texas Department of Transportation — Bridge Division

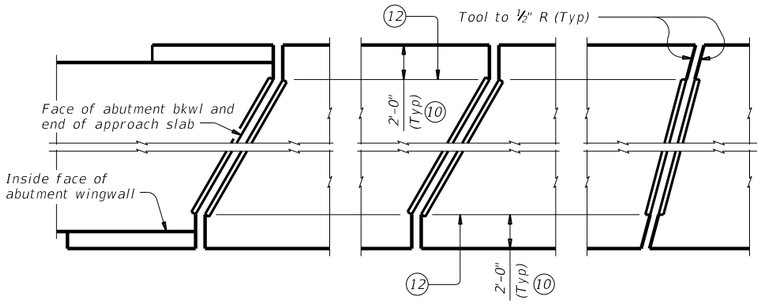
TRUSS SPAN REDECKING DETAILS

NBI: 13-045-0-0027-01-001

COLORADO RIVER BRIDGE REHABILITATION

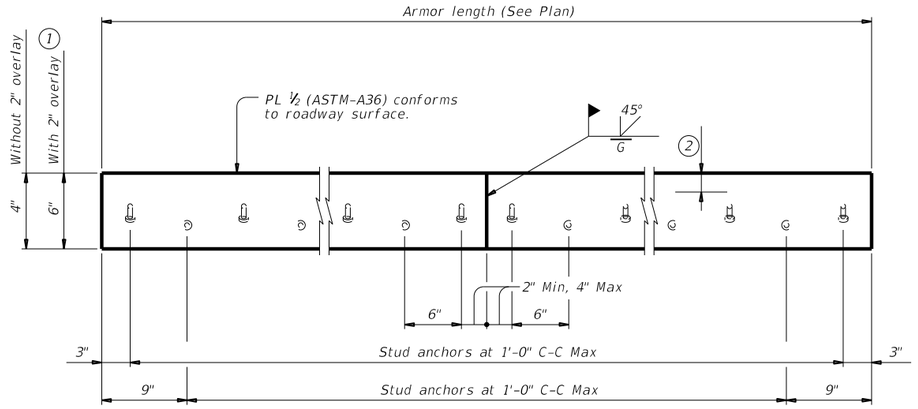
FILE: US0090_BRG_7707ni22.dgn	DN: ZU	CK: SN	DW: LH	CK: ZU
©TxDOT FEBRUARY 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		115

DATE: 3/6/2024 8:06:53 AM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn



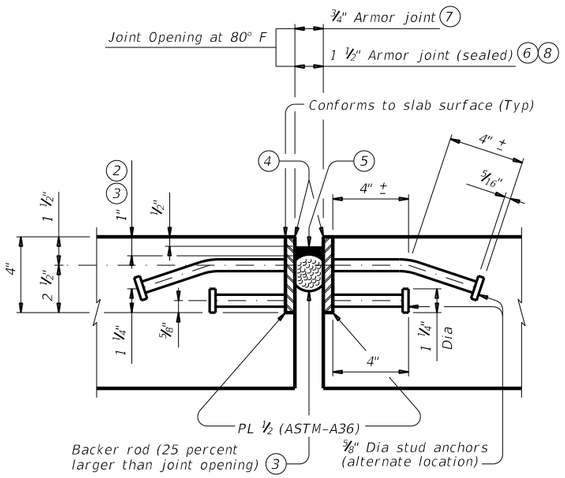
JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES

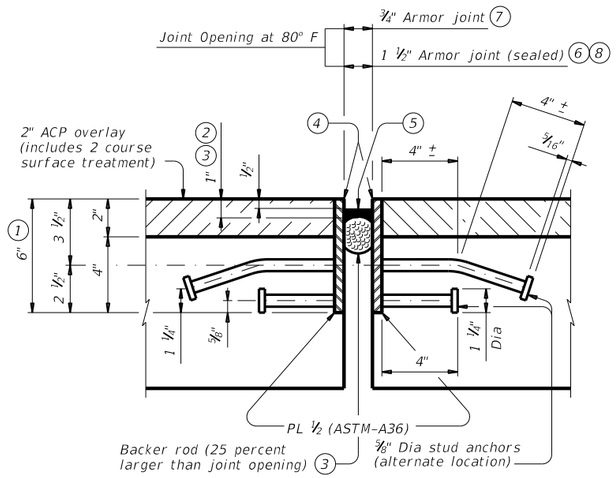


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor joint does not include joint sealant or backer rod.
8. Armor joint (sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



SHOWN WITH 2" OVERLAY AT JOINT LOCATION 1

ARMOR JOINT SECTIONS

Showing Armor Joint (Sealed)

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

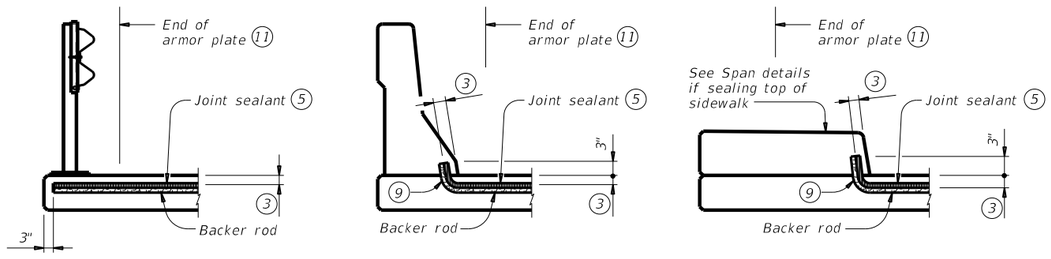
GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans.

These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.

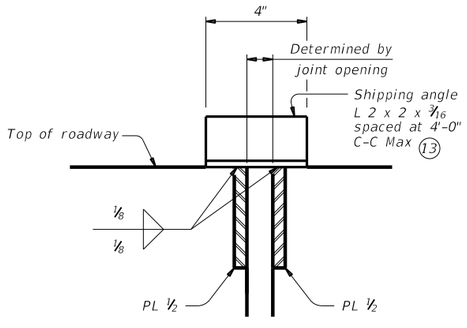
WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY 1	22.90 plf



AT STEEL POST BRIDGE RAIL | AT CONCRETE BRIDGE RAIL | AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION
With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

Texas Department of Transportation

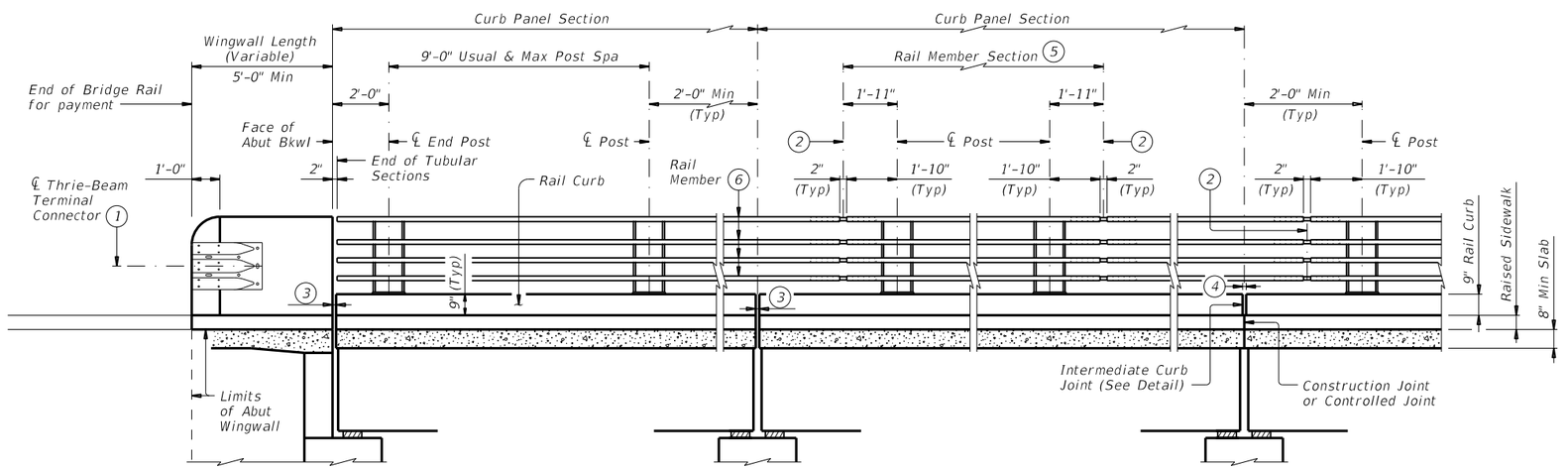
Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		116

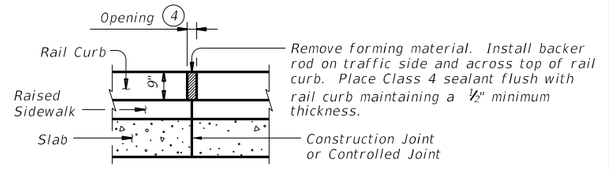
DATE: 3/6/2024 8:06:53 AM
FILE: pw:\\txdot.pro/ectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027\01042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn



AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

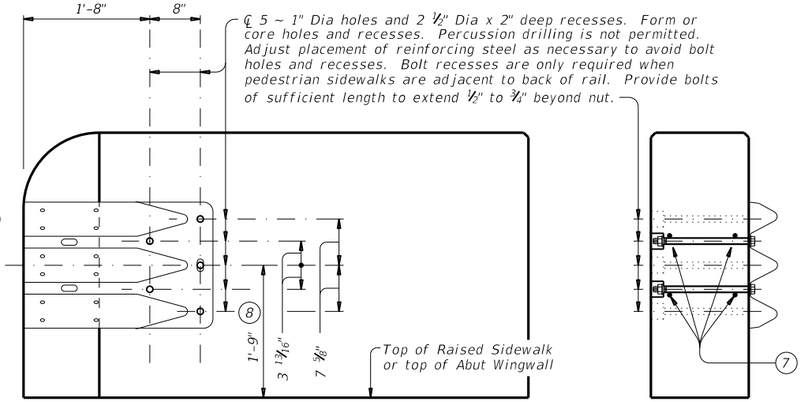
ROADWAY ELEVATION OF RAIL

Showing combination rail on a raised sidewalk.



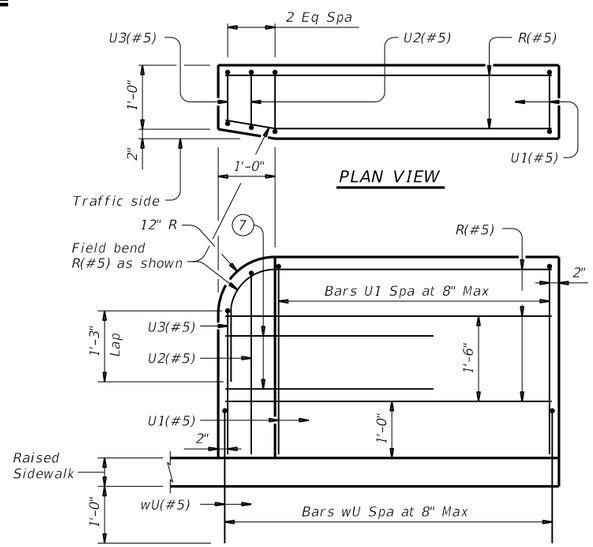
INTERMEDIATE CURB JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION | SECTION

TERMINAL CONNECTION DETAILS



AT ABUTMENT WINGWALL | AT BENTS WITH SLAB EXPANSION JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing with raised sidewalk

(1) *Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence." Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.*

(2) *℄ Expansion Joint or Splice Joint as required.*

(3) *Same as slab joint opening. (5" Max Expansion Joint).*

(4) *¼" Min, ¾" Max.*

(5) *Rail member sections must have at least two posts but not more than four.*

(6) *HSS 6 x 2 x ¼ (ASTM-A1085 or A500 Grade B).*

(7) *Place 4 additional Bars R(#5) 3'-8" in length inside Bars U(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.*

(8) *Increase 2" for structures with Overlay.*

SHEET 1 OF 4

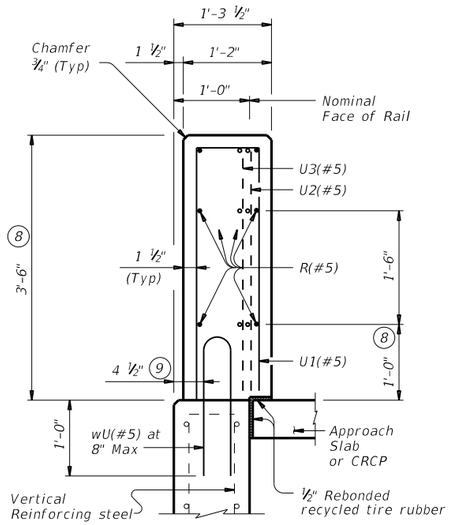
Texas Department of Transportation | Bridge Division Standard

COMBINATION RAIL

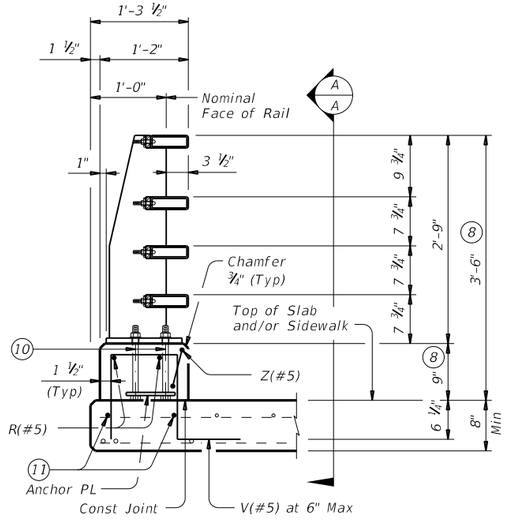
TYPE C1W

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		117

DATE: 3/6/2024 8:06:53 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010422\4 - Design\Plan Set\V. Bridge\US0090_BRG_7707mi23.dgn

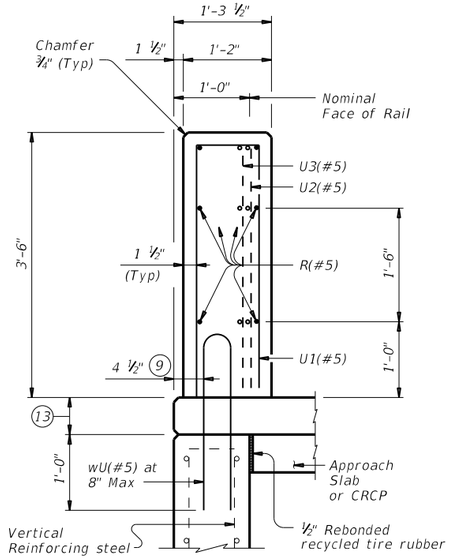


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

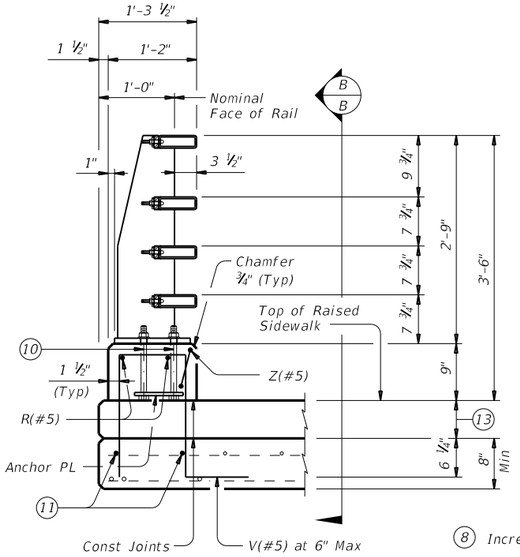


ON BRIDGE SLAB

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

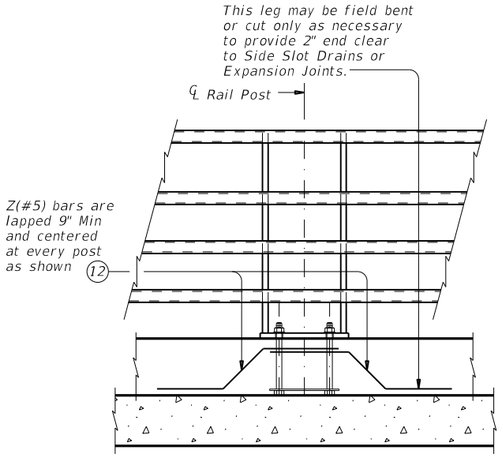


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



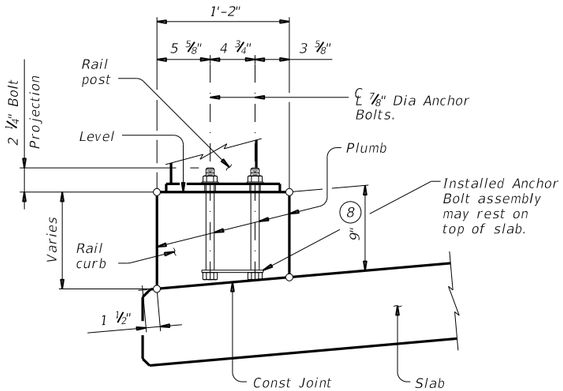
ON BRIDGE SLAB

SECTIONS THRU RAIL WITH RAISED SIDEWALK

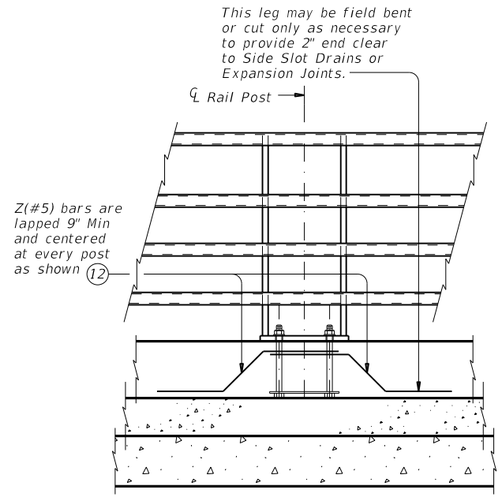


VIEW A-A

Bars V and R omitted for clarity.
Showing without raised sidewalk.

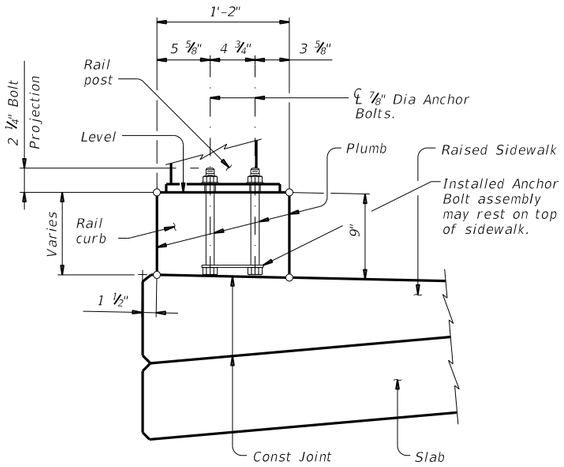


WITHOUT RAISED SIDEWALK



VIEW B-B

Bars V and R omitted for clarity.
Showing with raised sidewalk.



WITH RAISED SIDEWALK

RAIL CURB FORMING DETAIL

Reinforcing steel and rail curb chamfers not shown for clarity.

(8) Increase 2" for structures with Overlay.

(9) 51#4" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(10) ℄ 7#8" Dia Anchor Bolts. See "Anchor Bolt Assembly Details."

(11) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(12) Adjust Bars Z(#5) as necessary to avoid Bars V(#5).

(13) Raised Sidewalk.

(21) Use drill equipped with depth gauge stop device to keep from drilling through bottom of slab. If hole extends through to bottom of slab, plug bottom of hole prior to placing adhesive anchorage system. Do not drill substutute hole next to drill through hole. Embed EA1(#5) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5¾".
Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor istallation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

Texas Department of Transportation

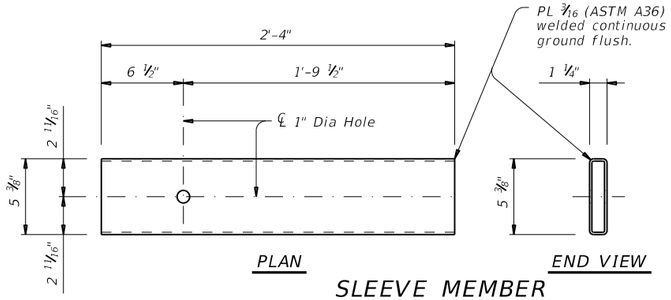
Bridge Division Standard

COMBINATION RAIL

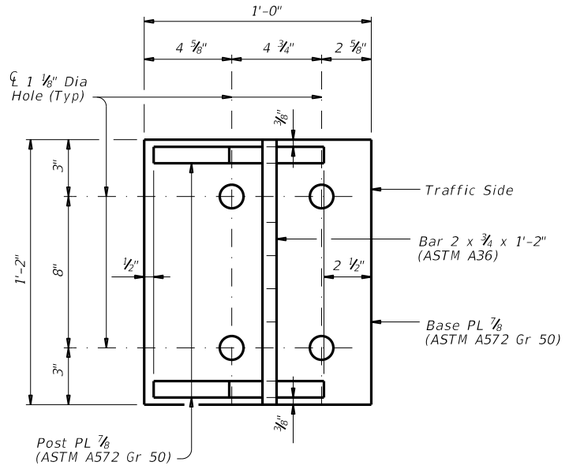
TYPE C1W

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		118

DATE: 3/6/2024 8:06:53 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027\01042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn

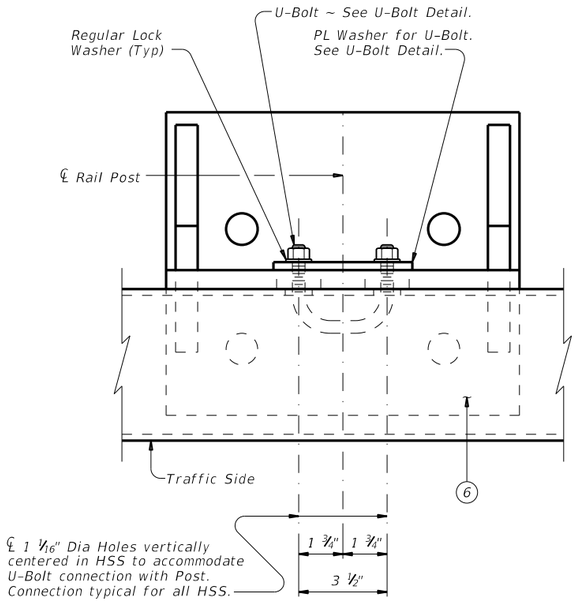


SLEEVE MEMBER



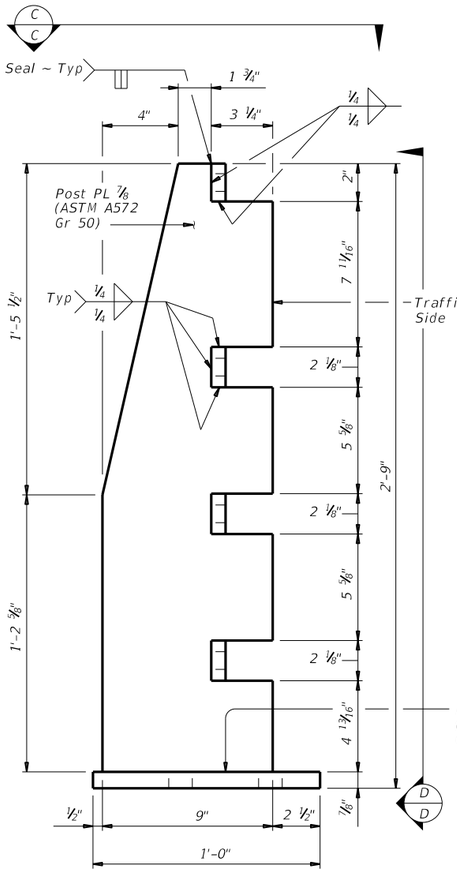
VIEW C-C

(Showing Hole location in Base PL)

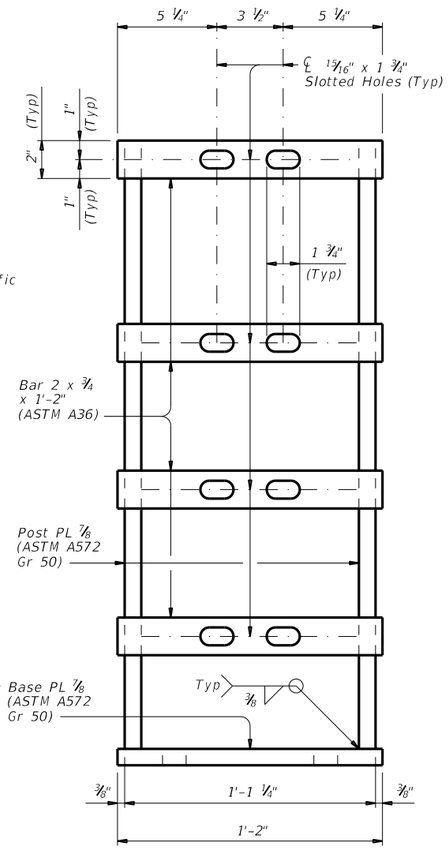


TOP VIEW OF RAIL POST

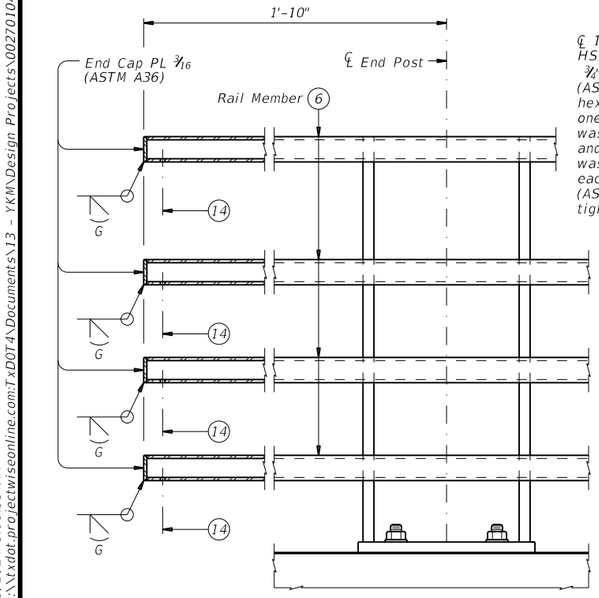
(Showing connection for rail post and HSS.)



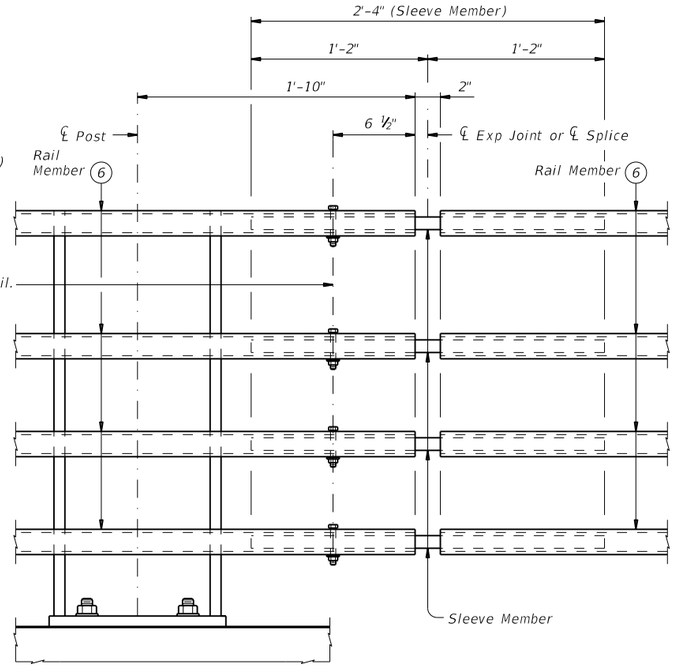
POST DETAIL



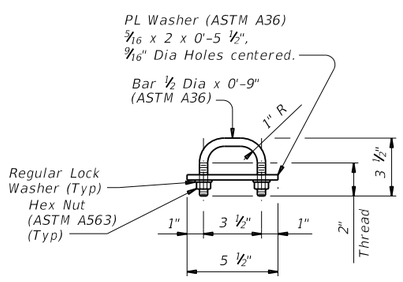
VIEW D-D



END CAPS ON HSS AT END POST



EXPANSION JOINT OR SPLICE



U-BOLT DETAIL

(Showing U-Bolt for rail post and HSS.)

⑥ HSS 6 x 2 x ¼ (ASTM A1085 or A500 Grade B).

⑭ ℄ ⅜" Dia Drain Hole in bottom of HSS.

SHEET 3 OF 4

Texas Department of Transportation

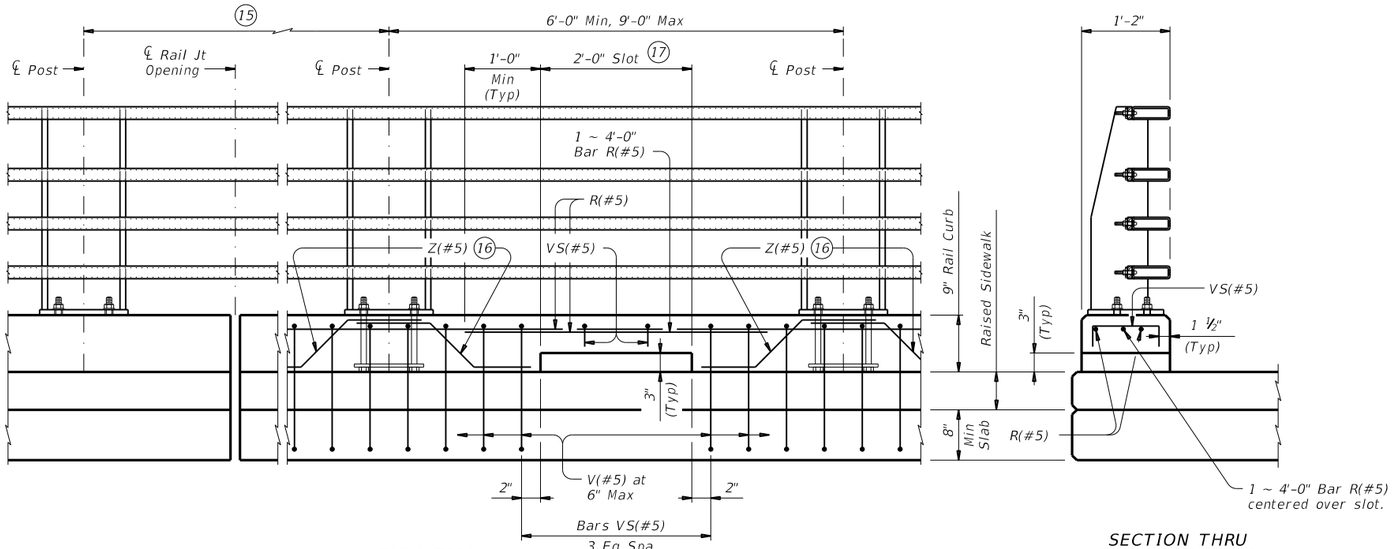
Bridge Division Standard

COMBINATION RAIL

TYPE C1W

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		119

DATE: 3/6/2024 8:06:53 AM
FILE: pw:\\txdot.pro\ectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn

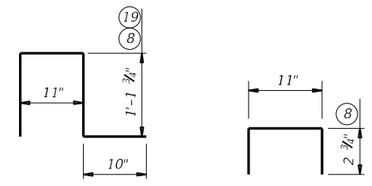


ELEVATION

SECTION THRU SIDE SLOT DRAIN

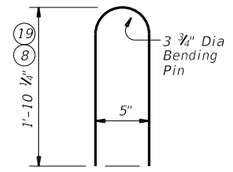
OPTIONAL SIDE SLOT DRAIN DETAILS (18)

Showing side slot drain on raised sidewalk, without raised sidewalk similar.

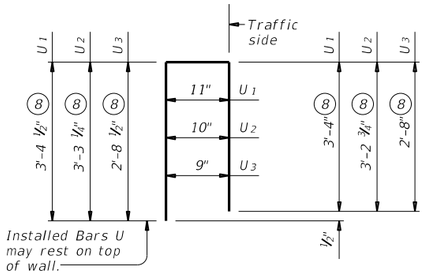


BARS V(#5)

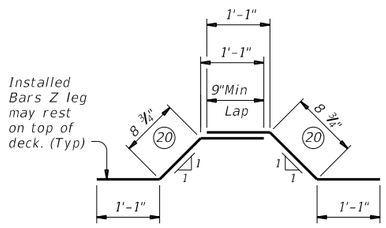
BARS VS(#5)



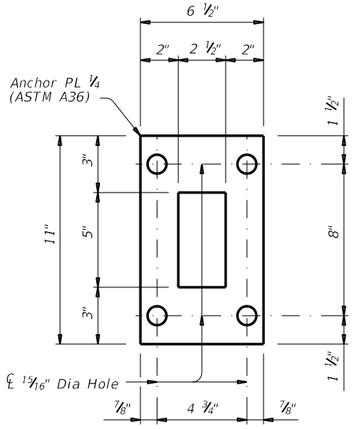
BARS wU(#5)



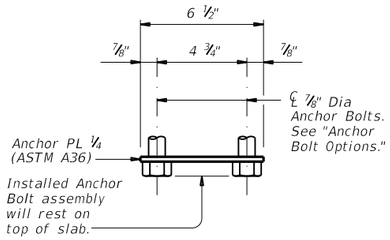
BARS U(#5)



BARS Z(#5)

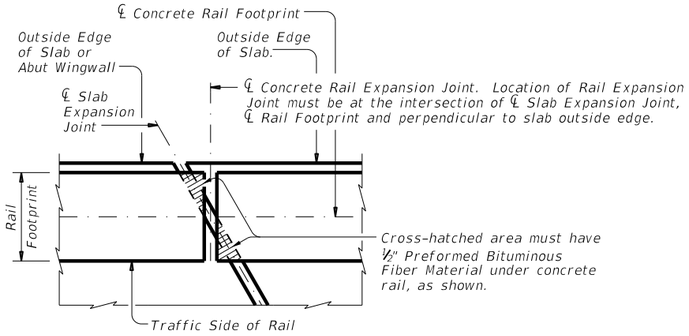


PLAN OF ANCHOR PLATE



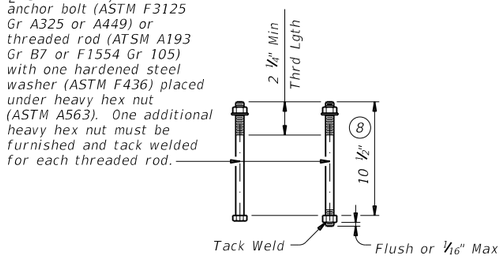
ELEVATION

ANCHOR BOLT ASSEMBLY DETAILS



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.



ANCHOR BOLT OPTIONS

(Showing Anchor Bolts for Base Plate)

(8) *Increase 2" for structures with Overlay.*

(15) *Side slot drains are not allowed in areas where there is a joint in the concrete curb between rail posts.*

(16) *Bars Z(#5). See "Section Thru Rail" and "View A-A or B-B" for Bar Z placement and spacing.*

(17) *Center side slot drain between posts within the limits shown.*

(18) *Side slot drains may be used where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway and a sidewalk, side slot drains are not permitted.*

(19) *For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.*

(20) *Increase 2 ¾" for structures with Overlay.*

CONSTRUCTION NOTES:

The face of tubular sections and rail curb must be plumb unless otherwise approved by the Engineer. Steel posts must be square to the top of curb. Use Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.

Bend tubes to required radius for curved rails. Shop drawings for approval are required for curved rails.

One shop splice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single V groove. Grind smooth.

Round or chamfer exposed edges of rail members and rail posts must be rounded or chamfered to approximately 1/16" by grinding.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide ASTM A1085 or A500 Gr B for all HSS.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel." Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Provide ⅞" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) placed under each heavy hex nut that conforms to ASTM A563 requirements.

Provide ½" Dia round bar U-bolts (ASTM A36) with plate washer (ASTM A36) and regular lock washers placed under hex nuts that conform to ASTM A563 requirements. See "U-Bolt Detail."

Provide Class "S" concrete. When Class "S" concrete for slab is HPC, include a minimum of 3 gallons of calcium nitrite inorganic corrosion inhibitor per cubic yard of Class "S" concrete.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

This railing cannot be used on bridges with expansion joints providing more than 5" movement or on cast-in-place retaining walls, unless otherwise noted.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Submit erection drawings showing panel lengths, rail post spacing, and anchor bolt setting, to the Engineer for approval.

Average weight of railing with no overlay:

205 plf total
131 plf (Conc)
74 plf (Steel).

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

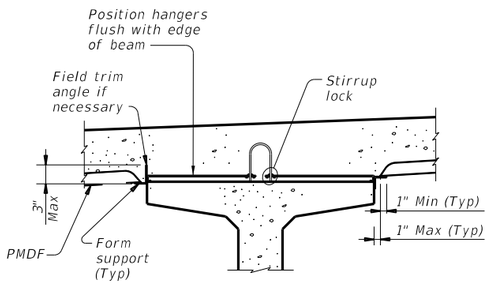
Bridge Division Standard

COMBINATION RAIL

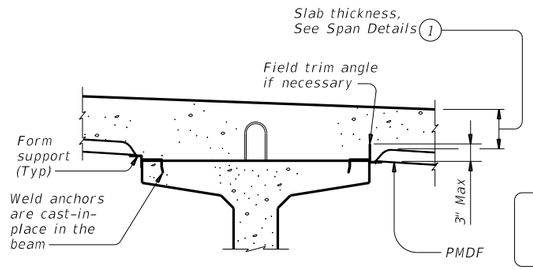
TYPE C1W

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH		
©TxDOT September 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0027	01	042		US 90	
	DIST	COUNTY			SHEET NO.	
	YKM	COLORADO			120	

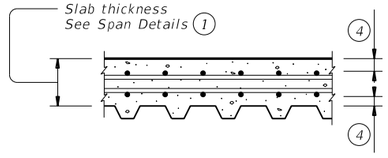
DATE: 3/6/2024 7:38:57 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn



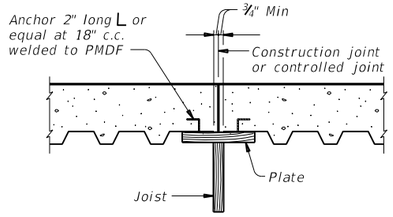
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

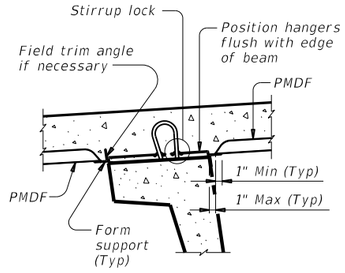


TYP LONGITUDINAL SLAB SECTION

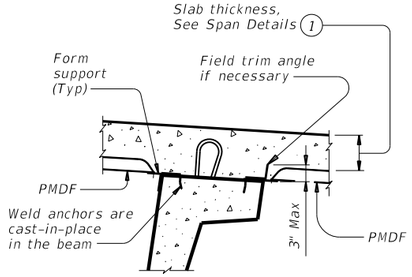


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

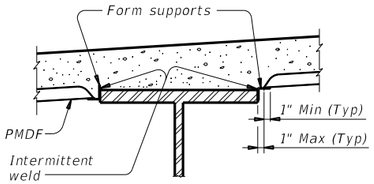
SECTION THRU CONSTRUCTION JOINT



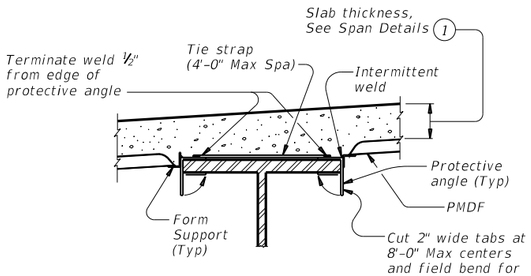
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

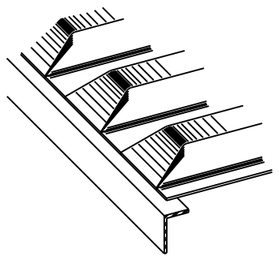


STEEL BEAMS AT COMPRESSION FLANGES

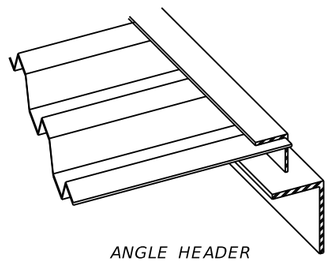


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



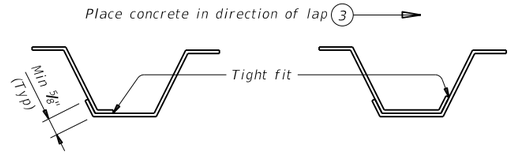
PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

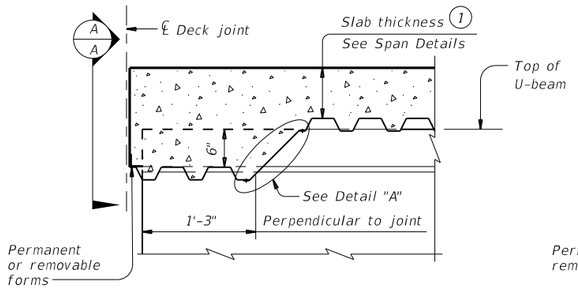
Bridge Division Standard

PERMANENT METAL DECK FORMS

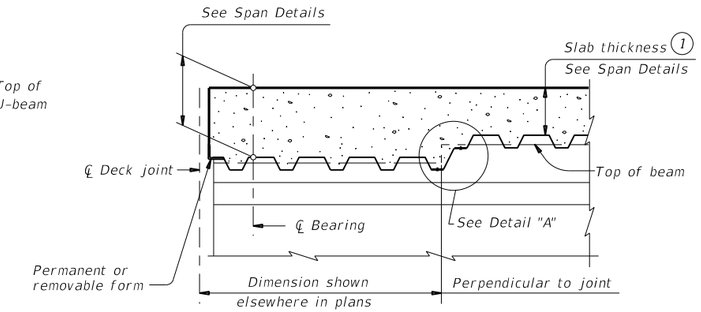
PMDF

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	YKM	COLORADO		121

DATE: 3/6/2024 7:38:57 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn

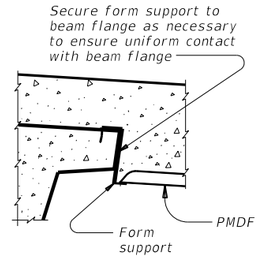


AT THICKENED SLAB END FOR U-BEAMS

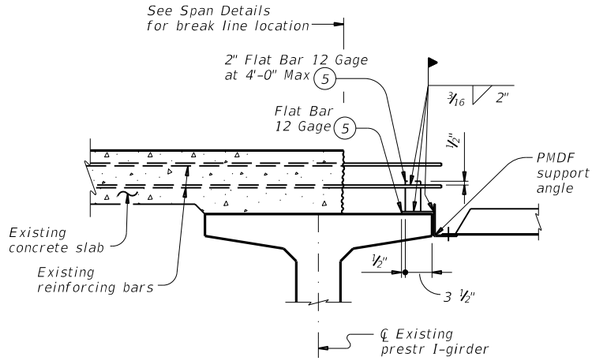


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

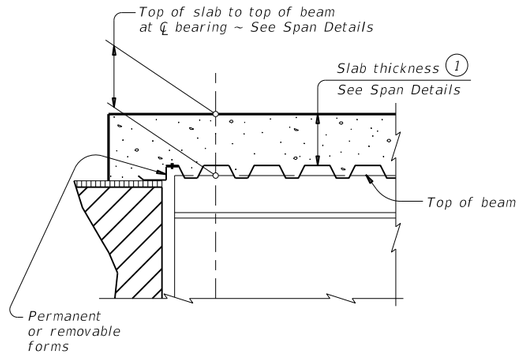
Showing I-beam block-out. No block-out for I-girders or steel beams.



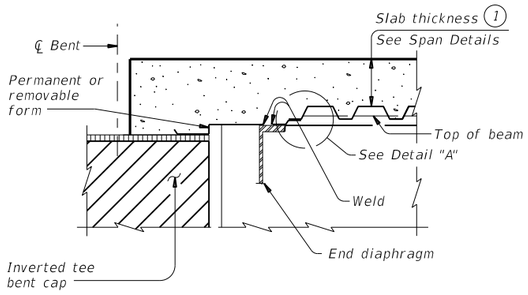
SECTION A-A



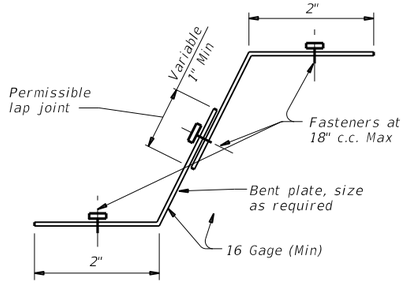
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



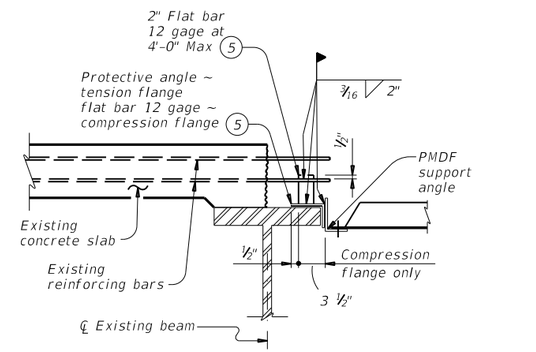
AT SLAB OVER ABUTMENT BACKWALL OR INVERTED-T STEM FOR CONCRETE BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INVERTED-T STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

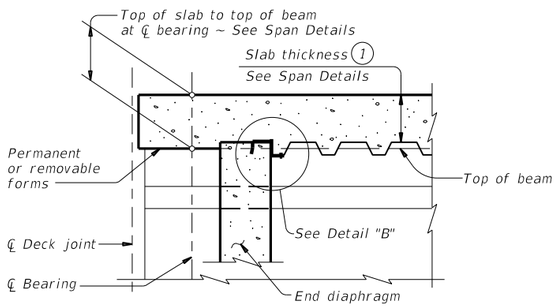


DETAIL "A"

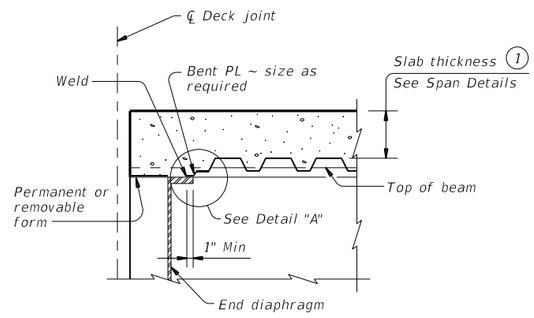


SHOWING STEEL BEAMS

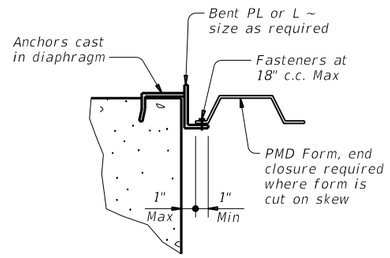
WIDENING DETAILS



AT CONCRETE END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

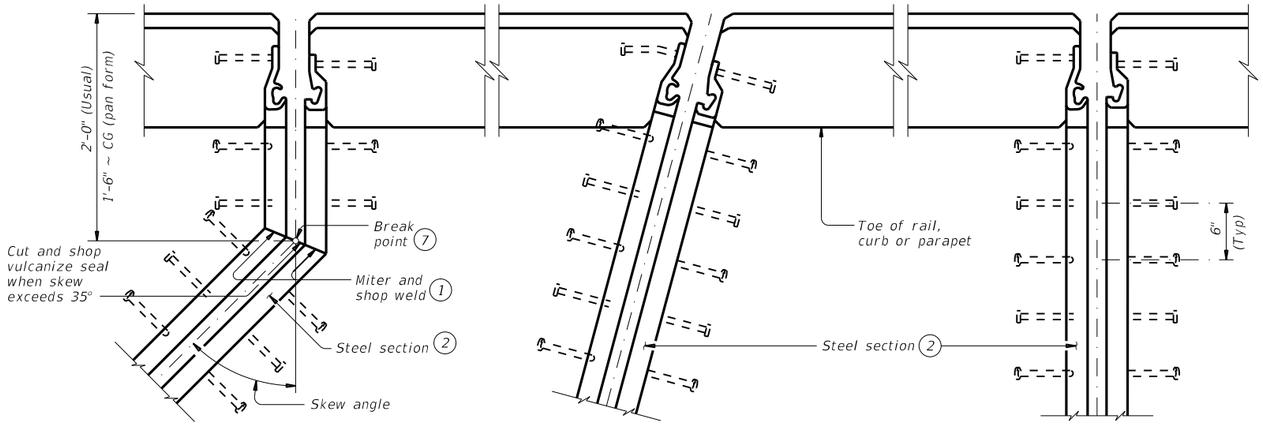
Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

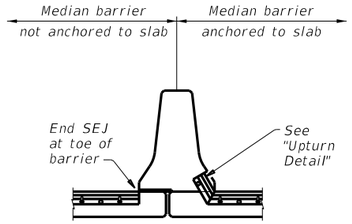
FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	YKM	COLORADO		122

DATE: 3/6/2024 7:38:57 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027\01042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn

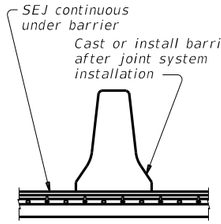


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

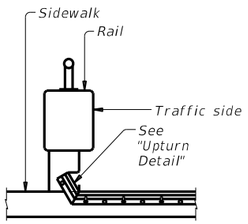
PLANS OF END CONDITIONS



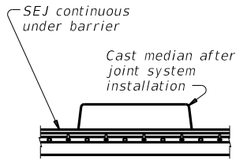
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



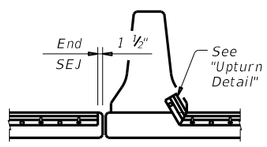
AT MEDIAN BARRIER



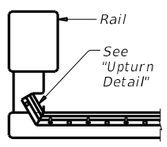
AT SIDEWALK BEHIND BRIDGE RAIL



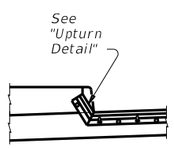
AT RAISED MEDIAN



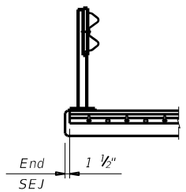
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

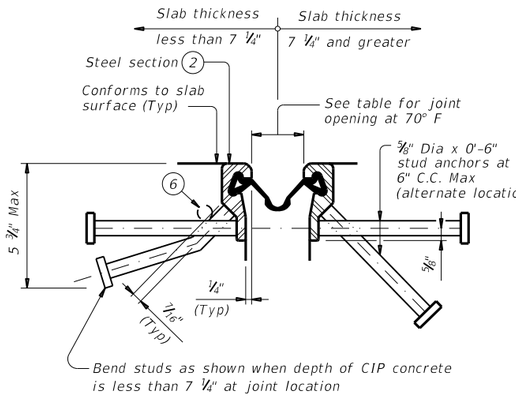


AT SIDEWALK

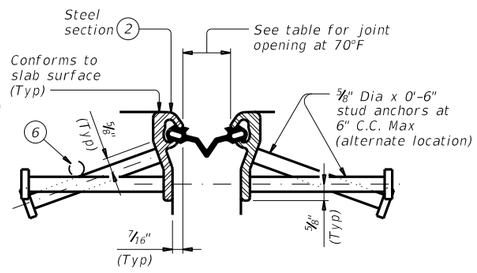


AT STEEL POST BRIDGE RAIL

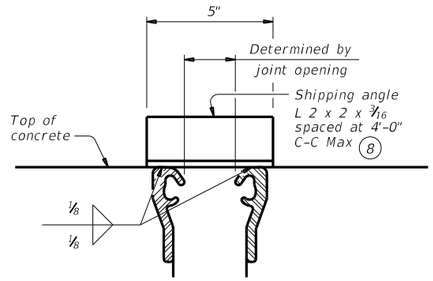
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

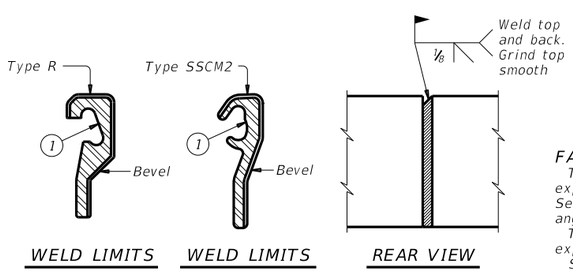
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

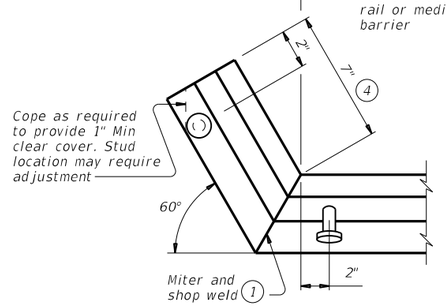
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.



UPTURN DETAIL

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

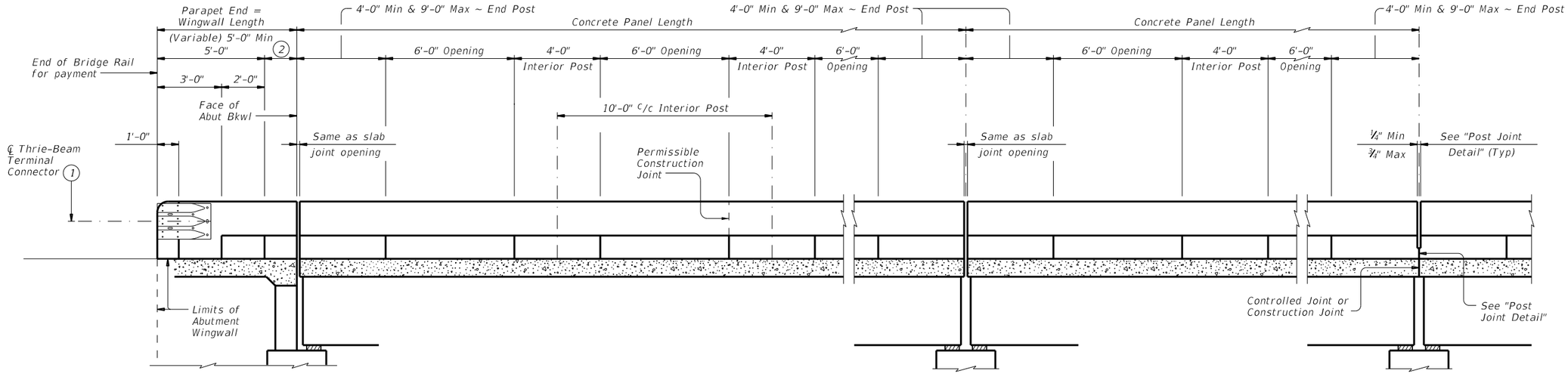
Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		123

DATE: 3/6/2024 7:24:19 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010042\4 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn

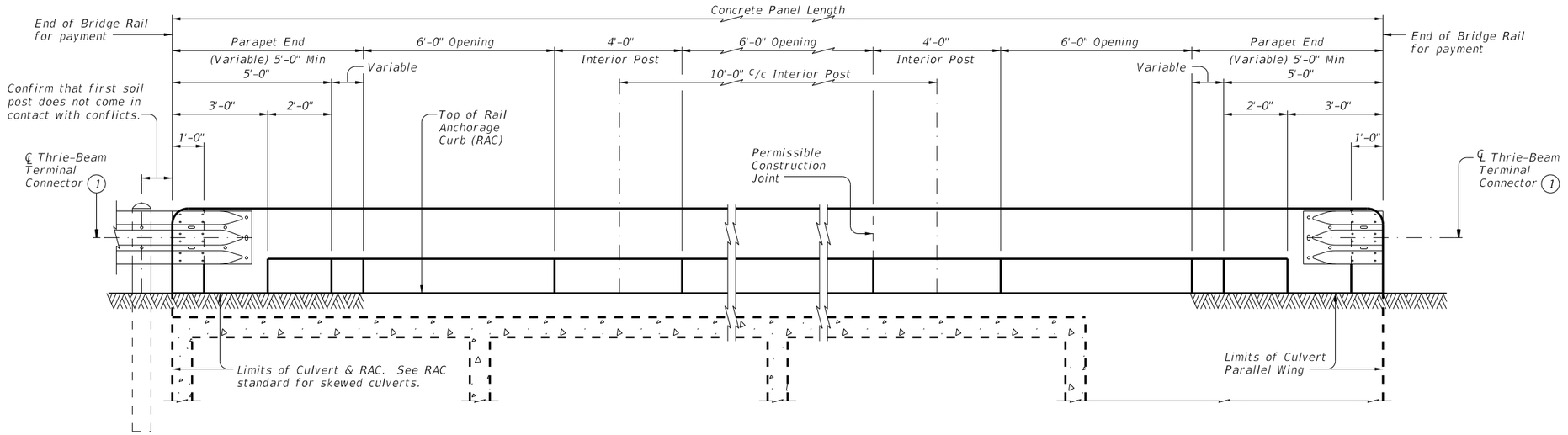


AT ABUTMENTS

AT BENTS WITH SLAB EXP JOINTS

AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE



AT STRAIGHT OR FLARED WINGS

AT PARALLEL WINGS

ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) *Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.*

(2) *Wingwall Length minus 5'-0" (Varies)*

Texas Department of Transportation

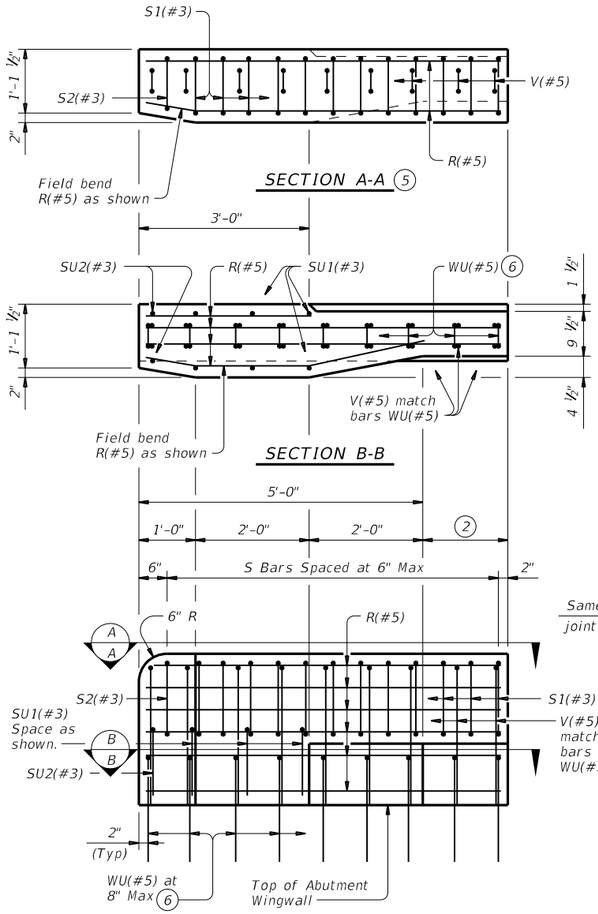
Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		124

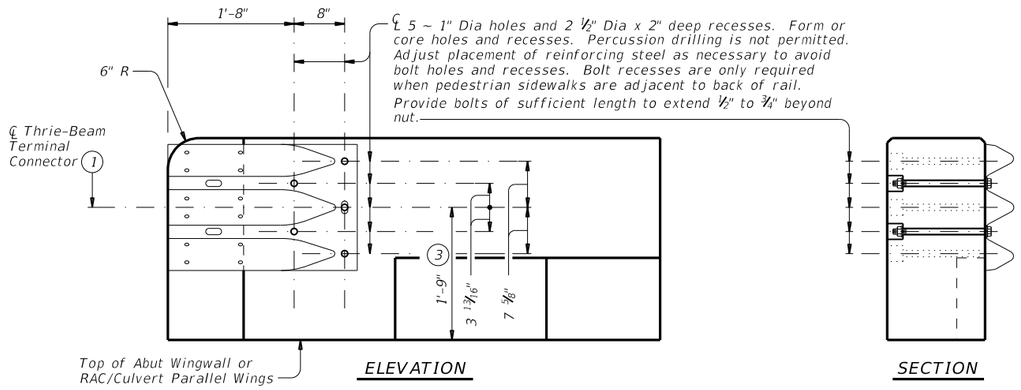
DATE: 3/6/2024 7:24:19 AM
FILE: pw:\\txdot-projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7. Bridge\US0090_BRG_7707mi23.dgn



SECTION A-A (5)

SECTION B-B

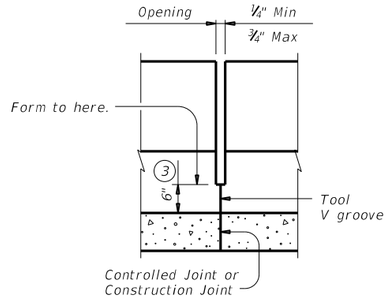
PARAPET END AT ABUT WINGWALL (6)



ELEVATION

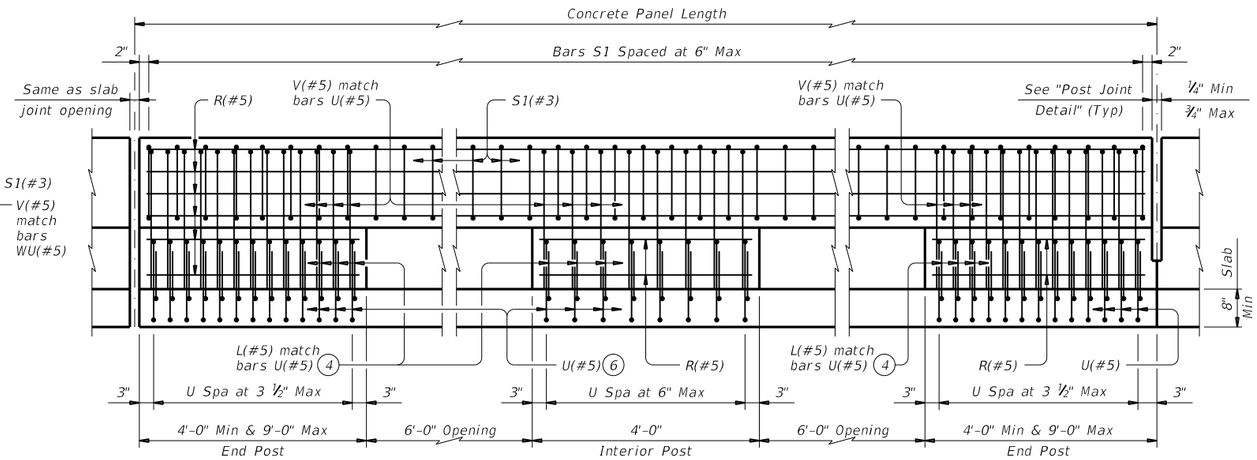
SECTION

TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

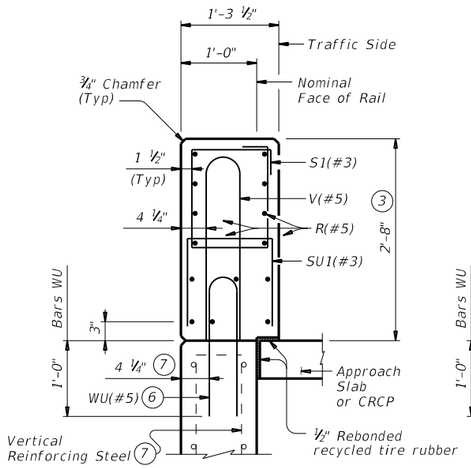
Bridge Division Standard

TRAFFIC RAIL

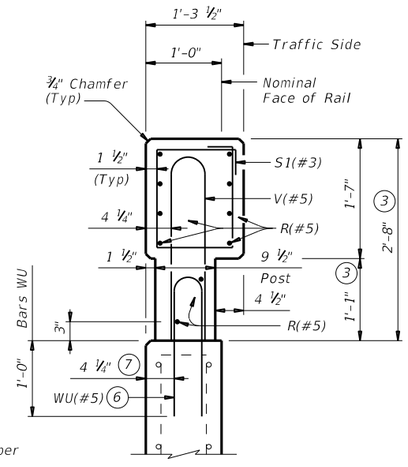
TYPE T223

FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		125

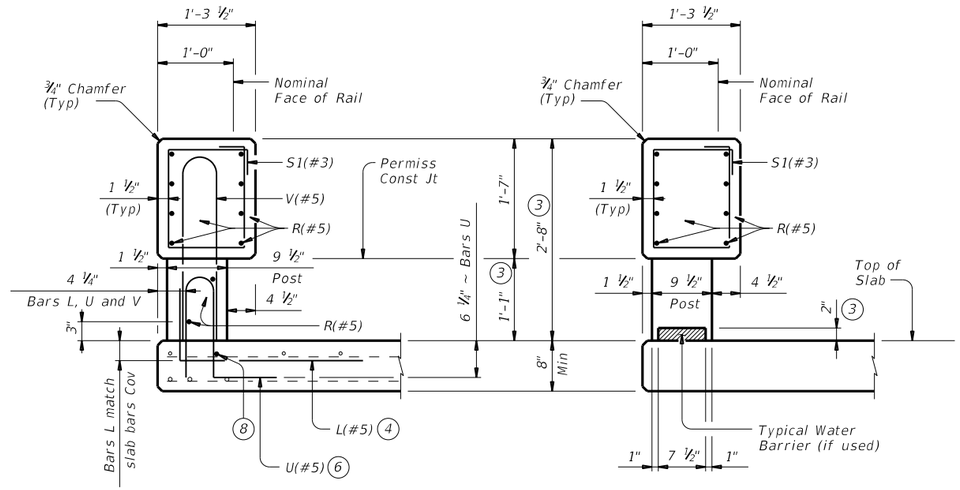
DATE: 3/6/2024 7:24:19 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT4\Documents\13 - YKM\Design Projects\0027010424 - Design\Plan Set\7 Bridge\US0090_BRG_7707mi23.dgn



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

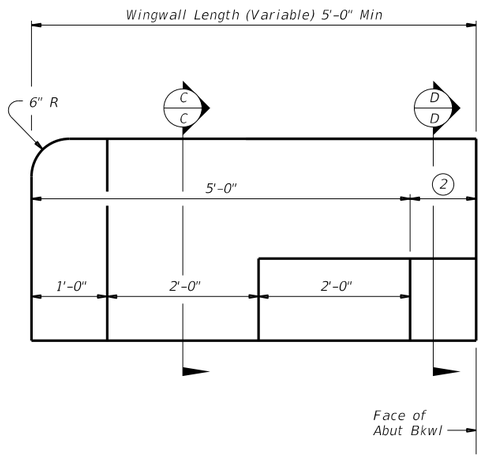


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

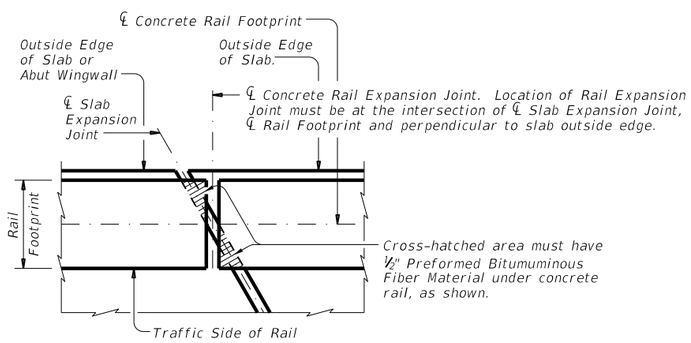
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

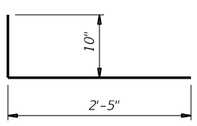
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

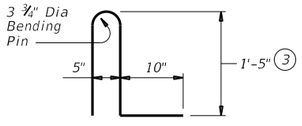
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

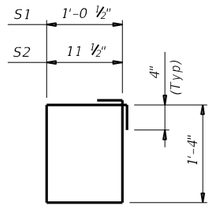
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



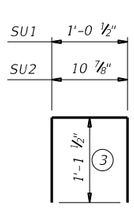
BARS L (#5)



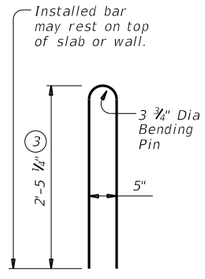
BARS U (#5) 9



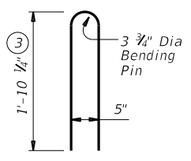
BARS S (#3)



BARS SU (#3)



BARS V (#5) 9



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

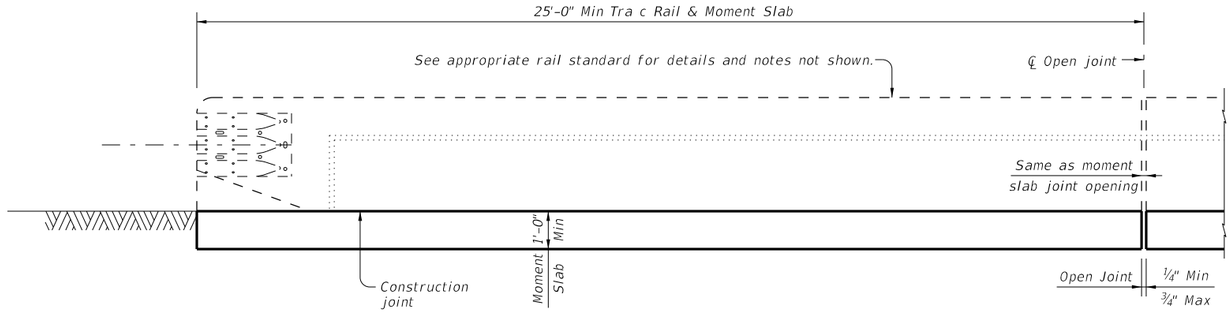
Bridge Division Standard

TRAFFIC RAIL

TYPE T223

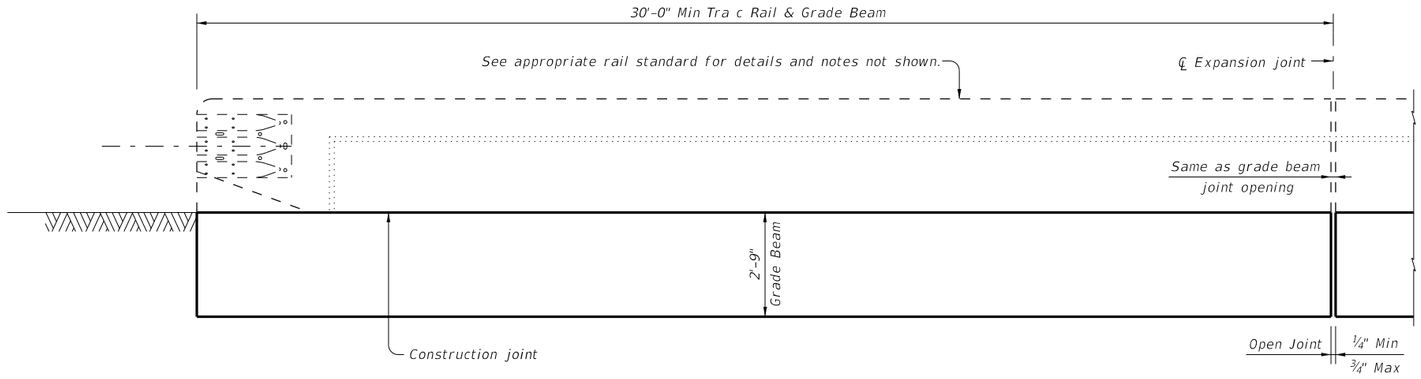
FILE: US0090_BRG_7707mi23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		126

DATE: 3/26/2024 $TIME$
FILE: $FILE$



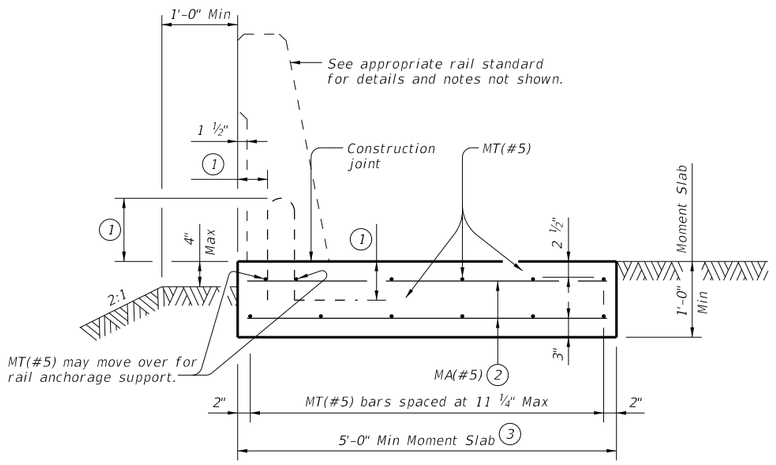
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



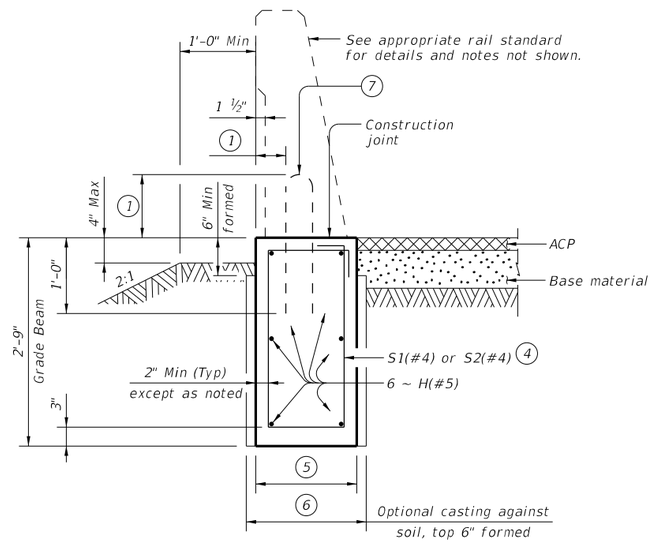
ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar.)



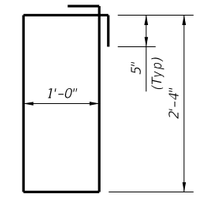
SECTION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar.)

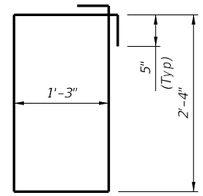
1. See applicable bridge rail standard.
2. MA(#5) space longitudinally along moment slab at 12" Max. (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.19 CY/LF and reinforcement = 22.4 LB/LF.
4. S1(#4) or S2(#4) spaced longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).
5. Use bar S1(#4) with 1'-4" grade beam width and bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.
   Approximate grade beam concrete = 0.14 CY/LF and reinforcement = 13.8 LB/LF.

   Use bar S2(#4) with 1'-7" grade beam width and bridge rail types: T66 and C66.
   Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.
6. 1'-6" for bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.

   1'-9" bridge rail types: T66 and C66.
7. Modify reinforcing on standard bridge rail anchorage if necessary by extending rail anchorage 12" Min, vertically into tra c rail



BARS S1(#4)



BARS S2(#4)

CONSTRUCTION NOTES:

Align moment slab (TRF-MS) or grade beam (TRF-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF-MS) or grade beam (TRF-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for bars S1(#4), S2(#4) and H(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF-MS) or grade beam (TRF-GB) foundation that is acceptable for tra c rails which are MASH TL-2, TL-3, or TL-4 compliant.

See elsewhere in the plans for selected options between moment slab (TRF-MS) and/or grade beam (TRF-GB).

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modi ed as necessary to apply to speci c installations required on the project.

Payment for moment slab (TRF-MS) and/or grade beam (TRF-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

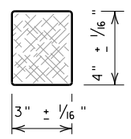
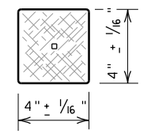
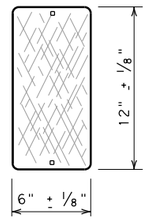
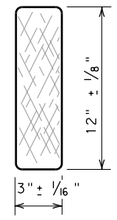
Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS
FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

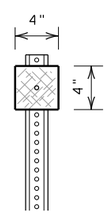
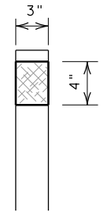
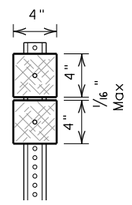
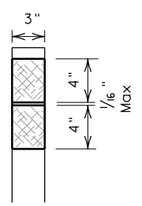
TRF

FILE: RL-TRF-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
07-20: Added moment slab with rail foundation lengths.	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		127

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

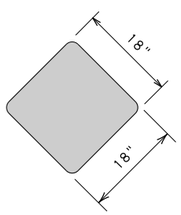
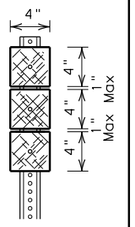
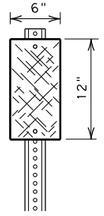
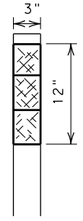
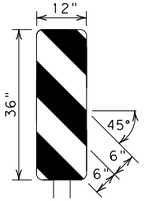
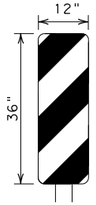
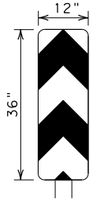
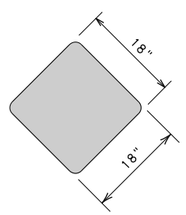
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

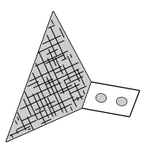
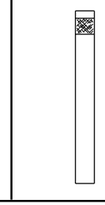
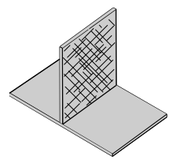
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

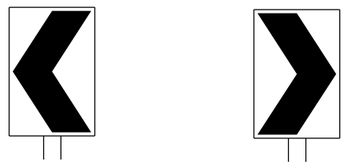
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

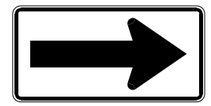
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	COLORADO		128

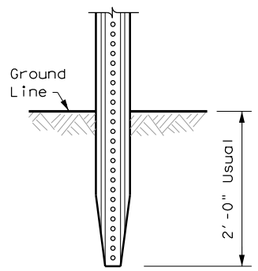
20A

DATE: 3/26/2024 $TIME$
FILE: $FILE$

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

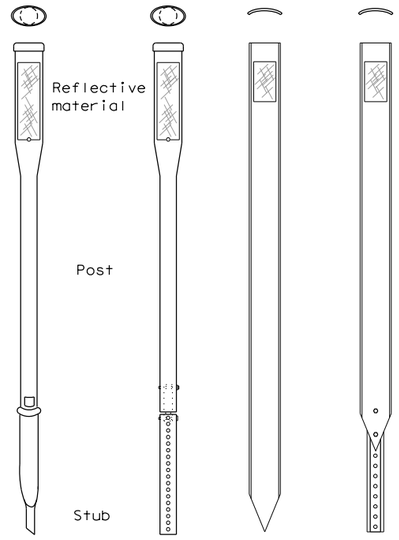


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

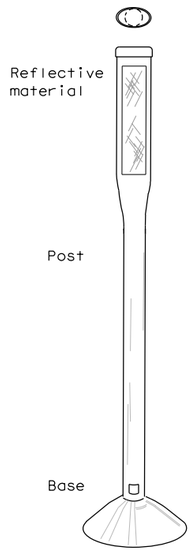
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



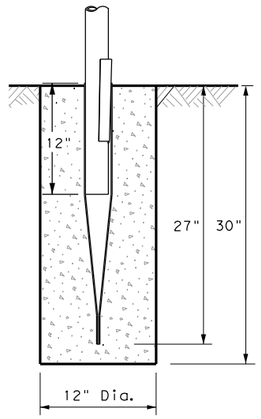
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

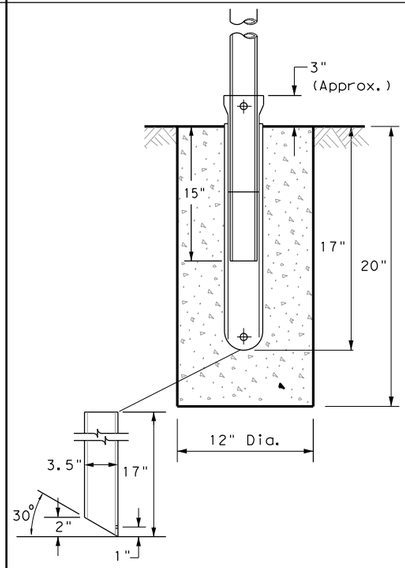
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

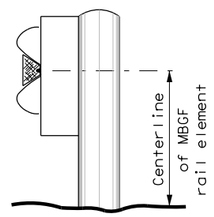
NOTE

1. Install per manufacturer's recommendations.

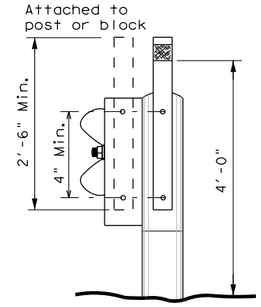
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

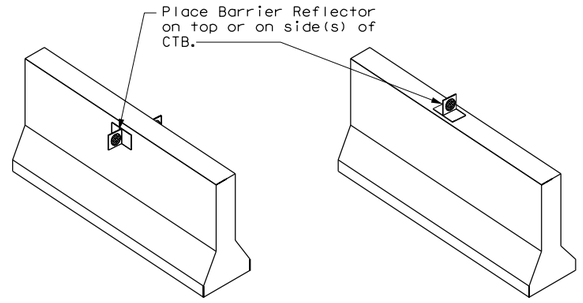
GF1



GF2



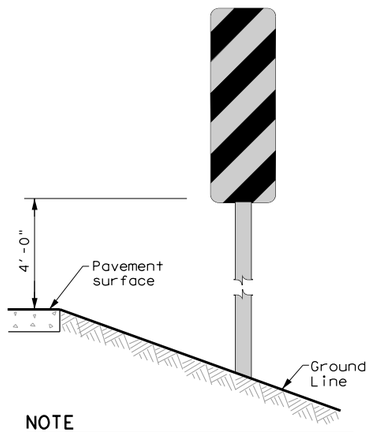
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

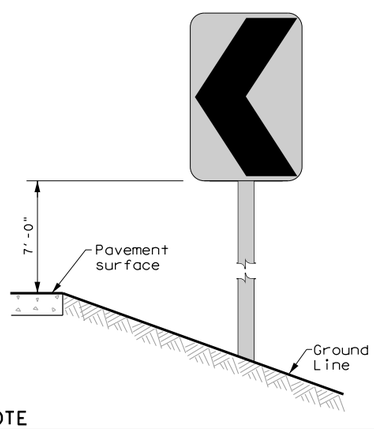
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

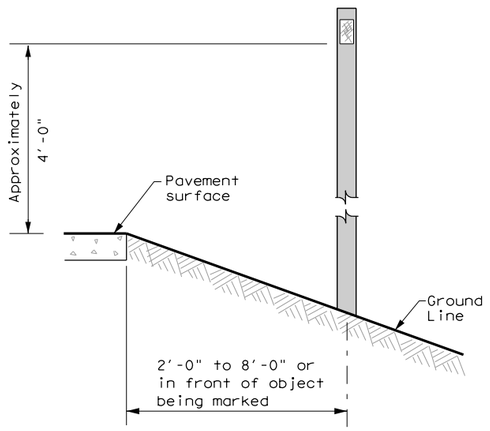
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	COLORADO		129

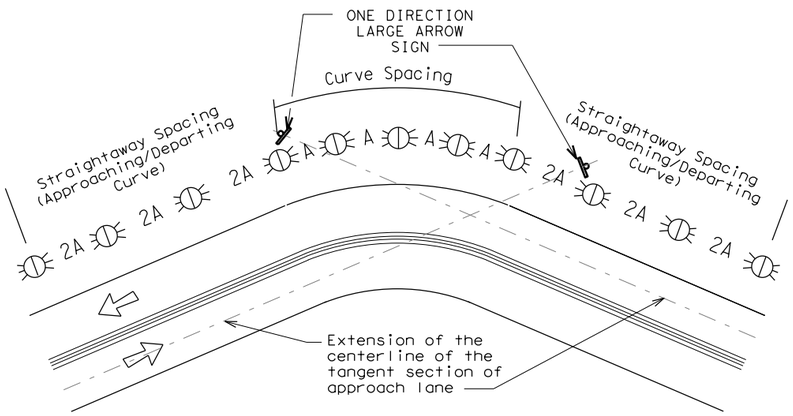
20B

DATE: 3/26/2024 $TIME$
FILE: $FILE$

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

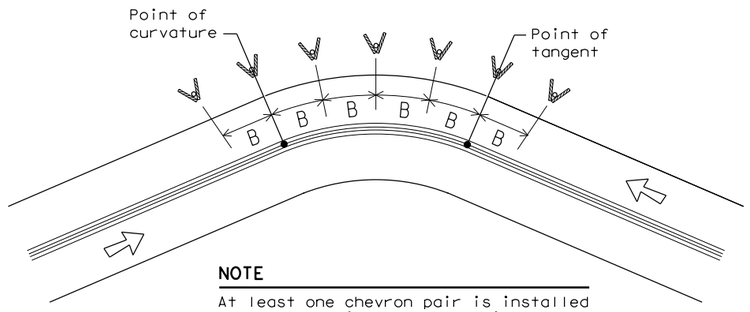
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

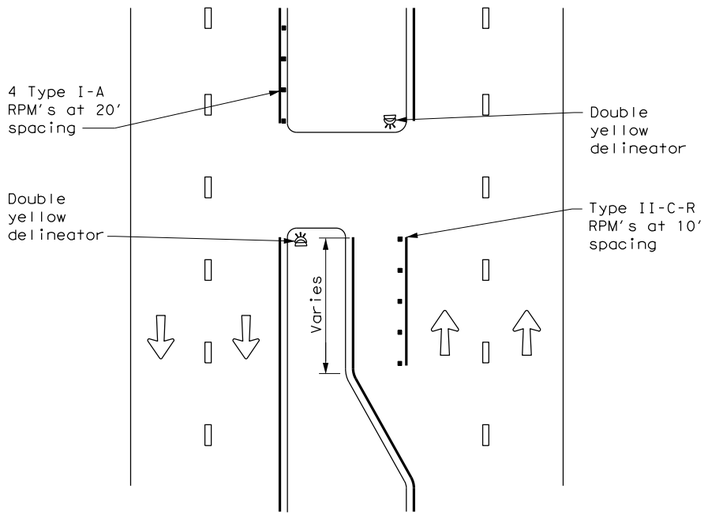
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	YKM	COLORADO		130

20C

DATE: 3/26/2024 $TIME$
FILE: $FILE$

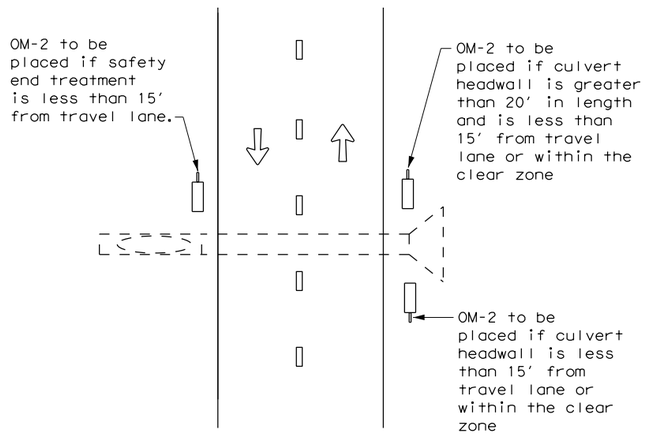
DATE: 3/26/2024 $TIME$
FILE: $FILE$

CROSSOVERS



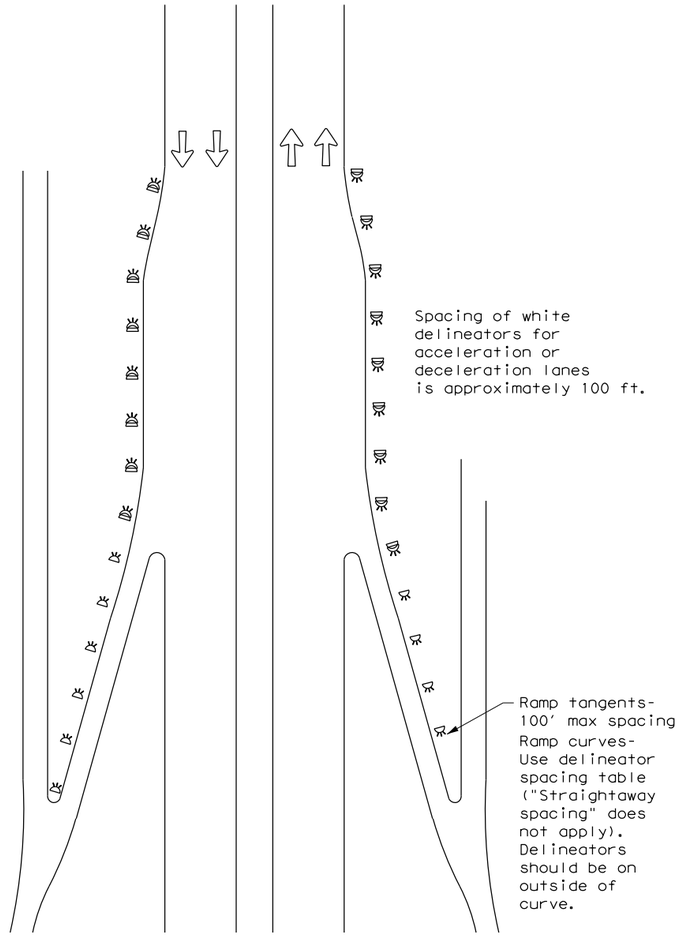
DETAIL 1

FOR CULVERTS WITHOUT MBGF



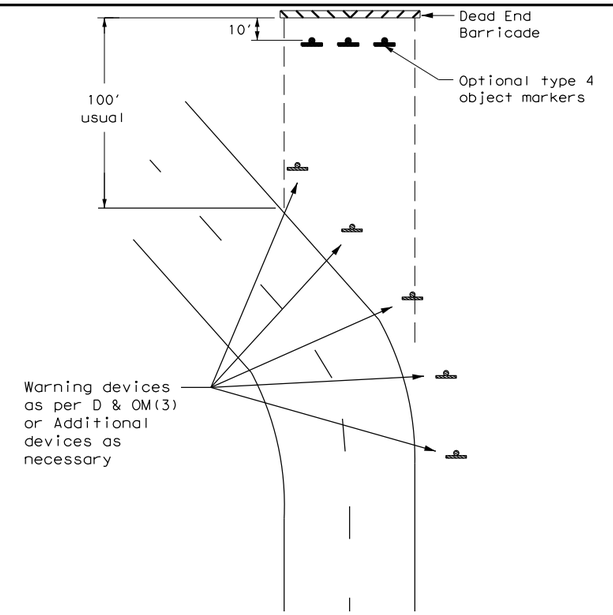
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



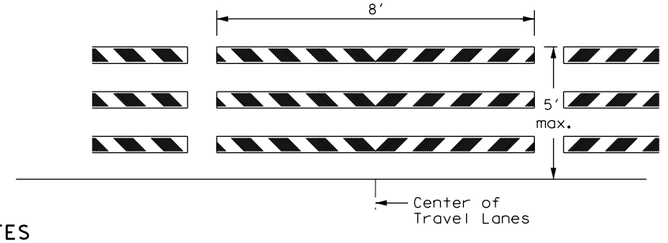
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

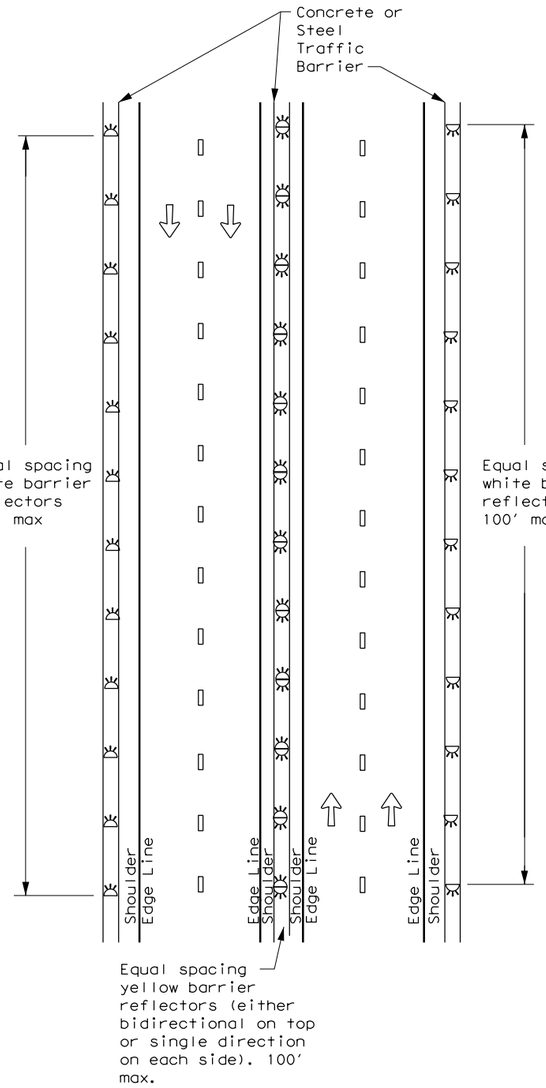
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
3-15	DIST	COUNTY		SHEET NO.
7-20	YKM	COLORADO		131

20D

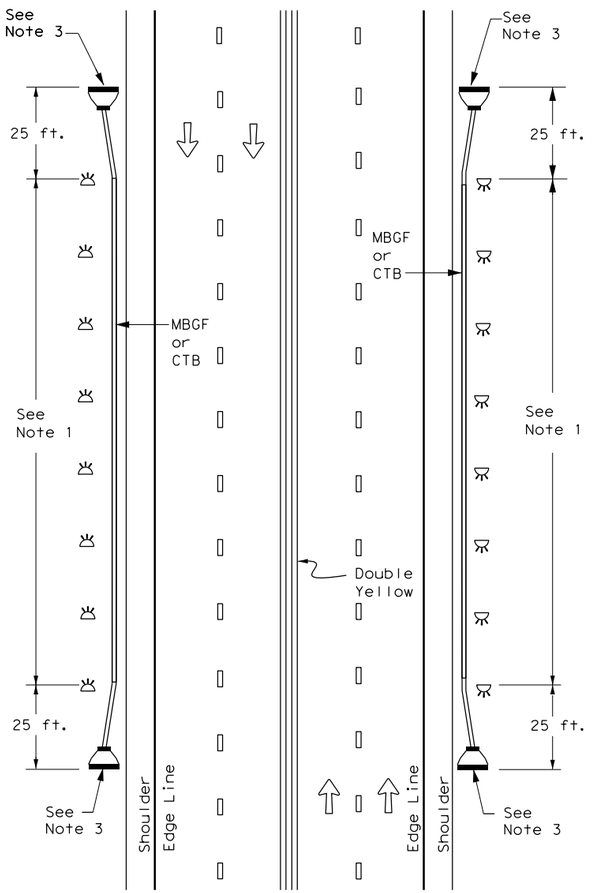
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 3/29/2024 $TIME$
FILE: $FILE$

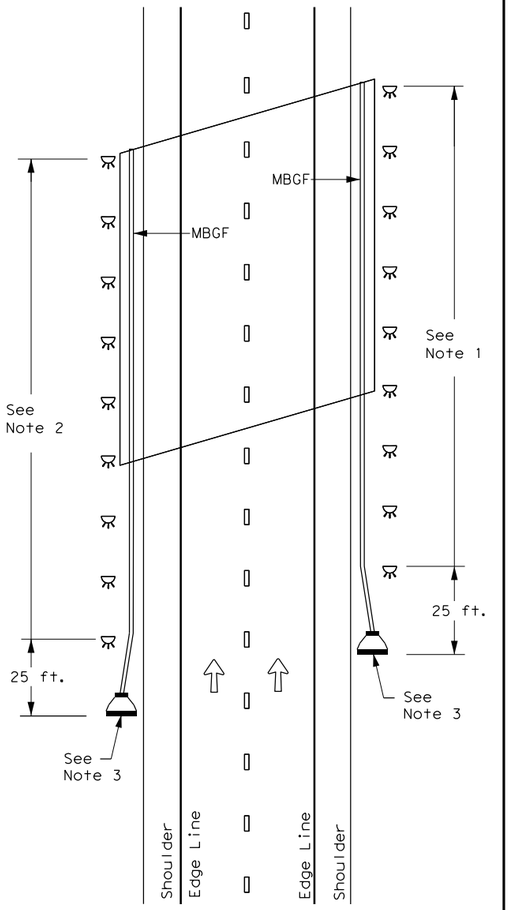
CONTINUOUS CONCRETE OR STEEL BARRIER



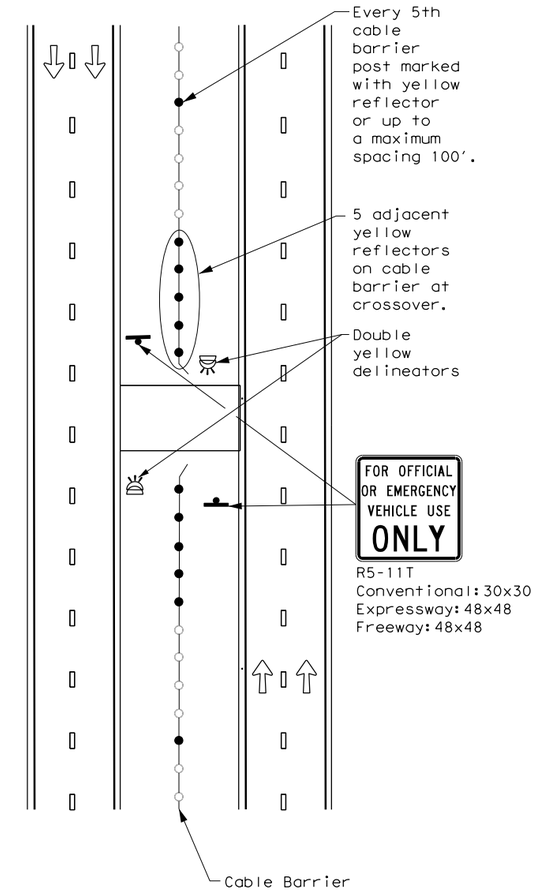
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

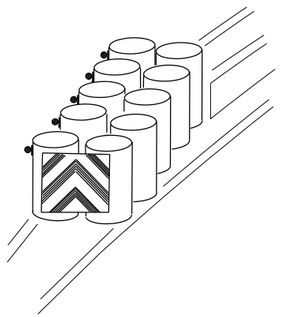
Traffic Safety Division Standard

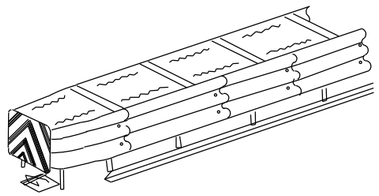
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

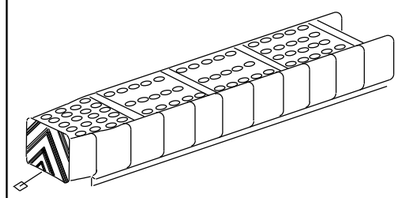
D & OM(6)-20

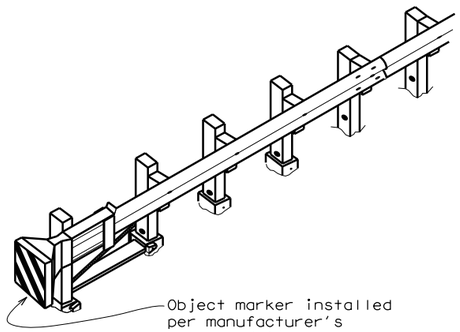
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
7-20	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		132

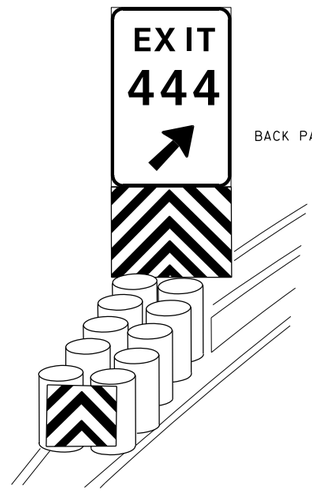
20F

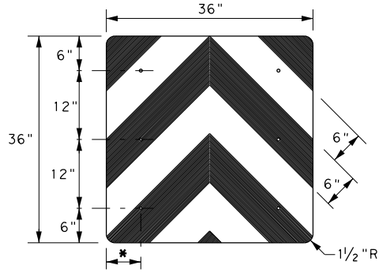


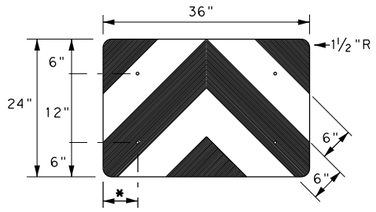




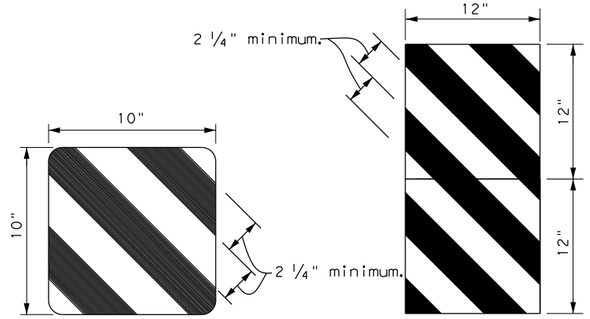




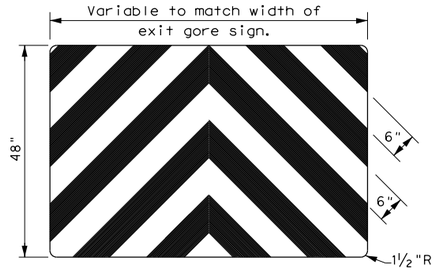


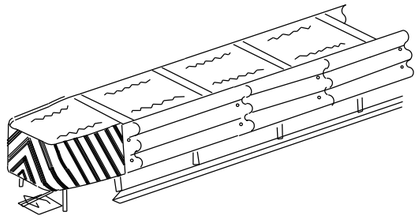


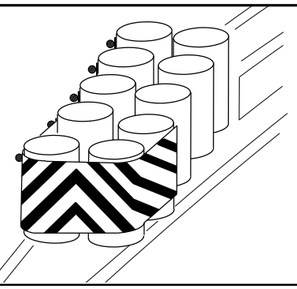
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

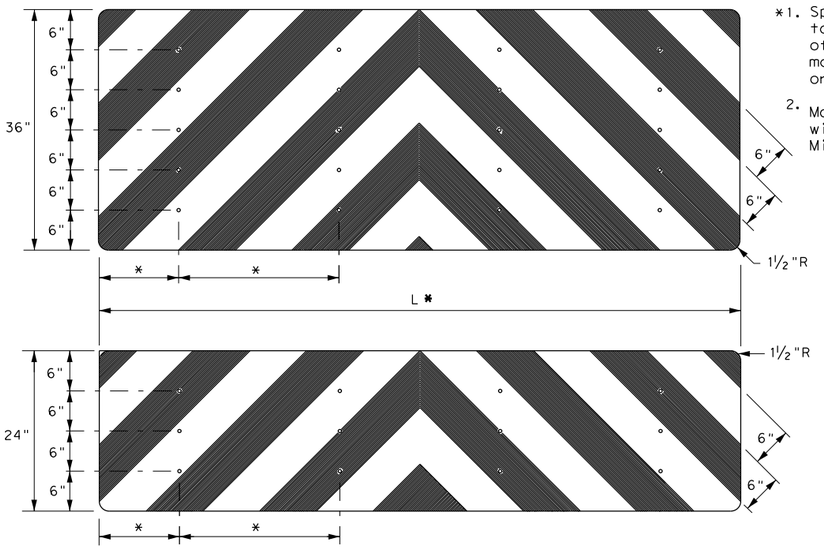


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

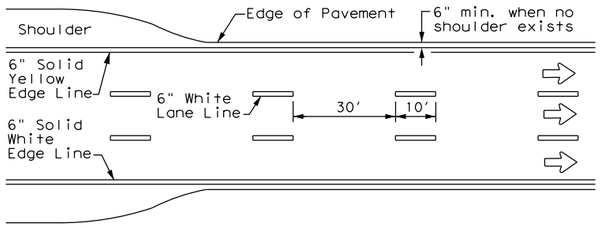
D & OM(VIA)-20

FILE: __domvig20.dgn__	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	YKM	COLORADO		133
4-98 7-20				

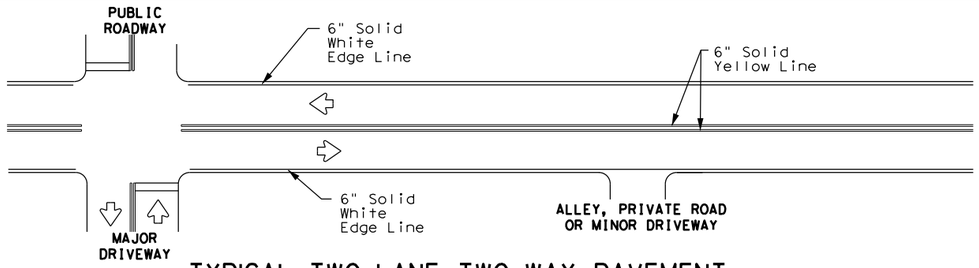
20C

DATE: 3/29/2024 $TIME$
FILE: $FILE$

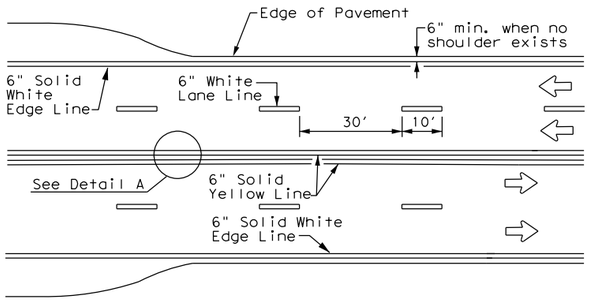
DATE: 3/29/2024 $TIME$
FILE: $FILE$

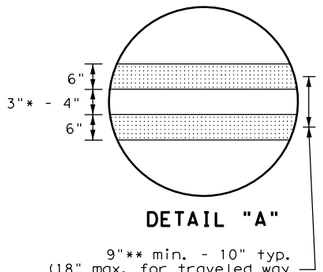


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

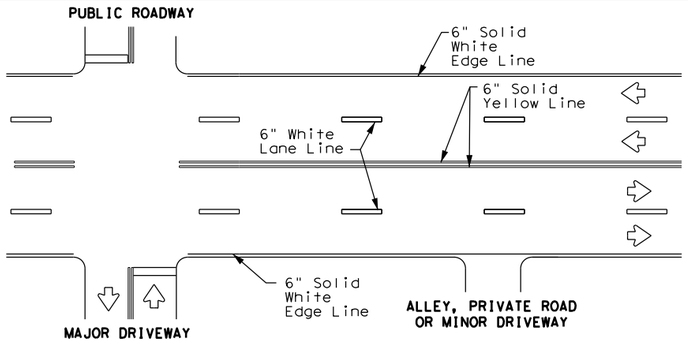




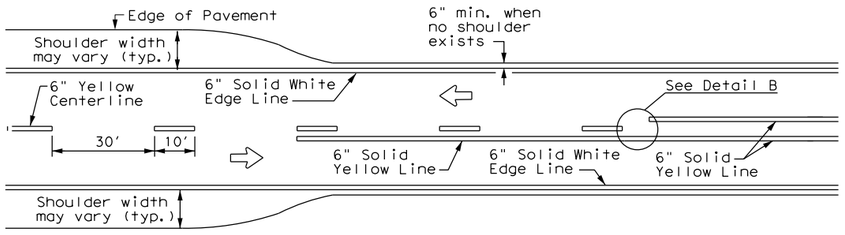
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

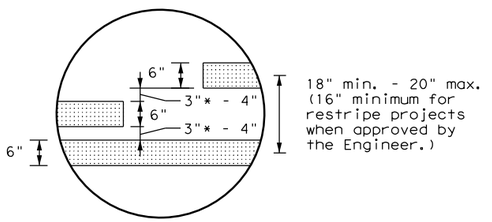
** 8" minimum for restripe projects when approved by the Engineer.



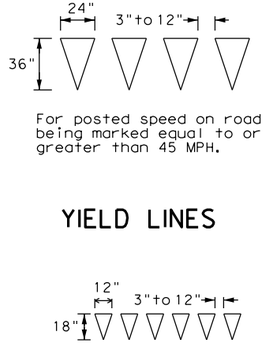
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

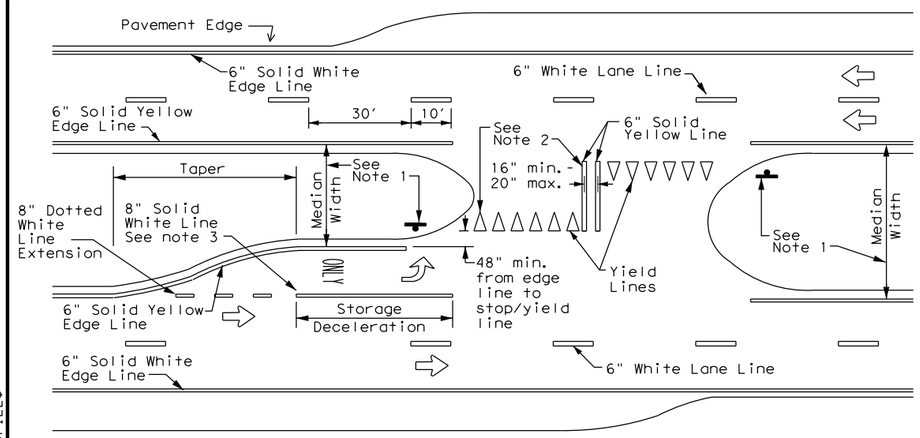


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

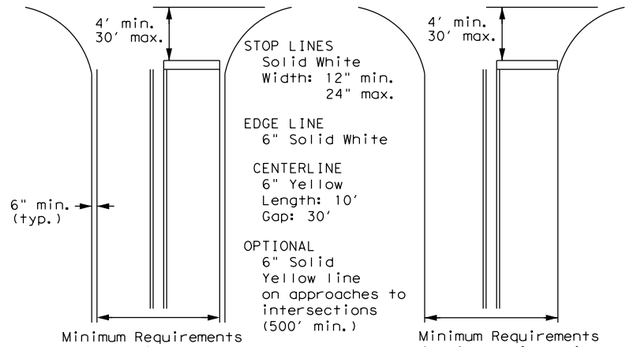
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if sign are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

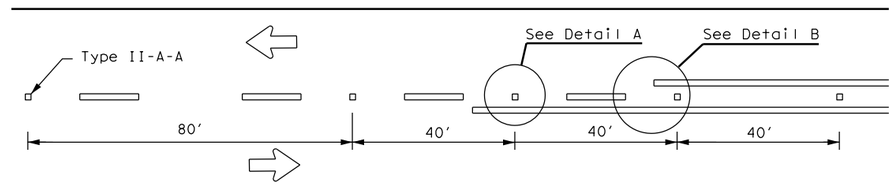
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

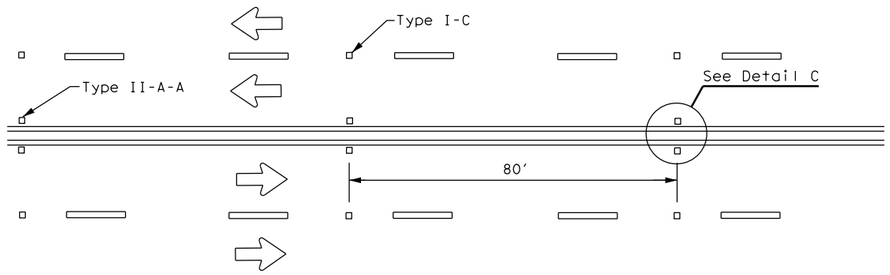
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0027	01	042	US 90
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	YKM	COLORADO		134

22A

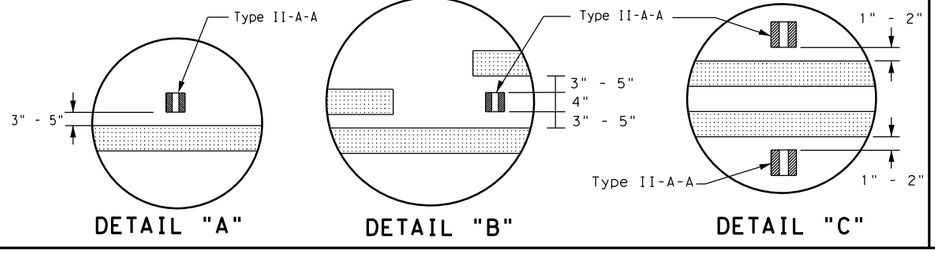
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

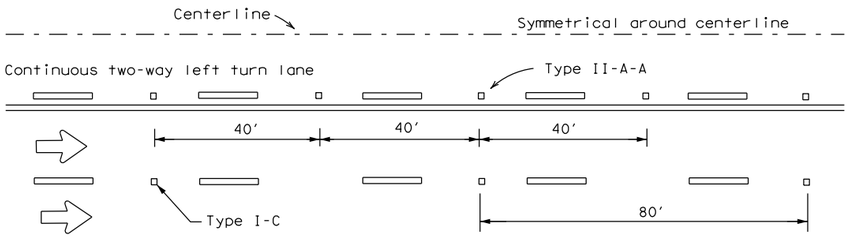


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

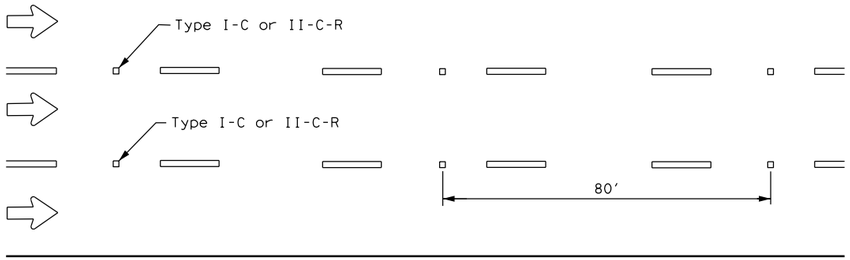


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



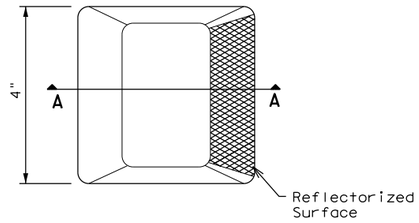
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

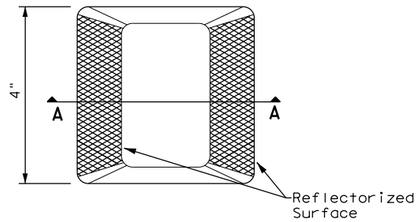
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

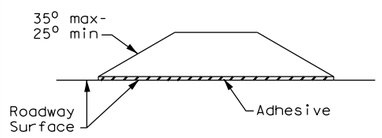
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

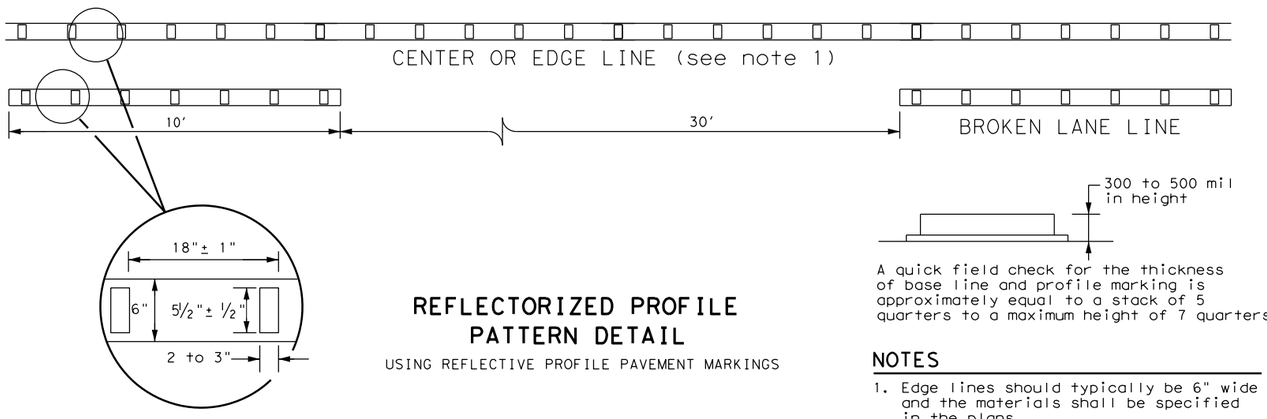


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

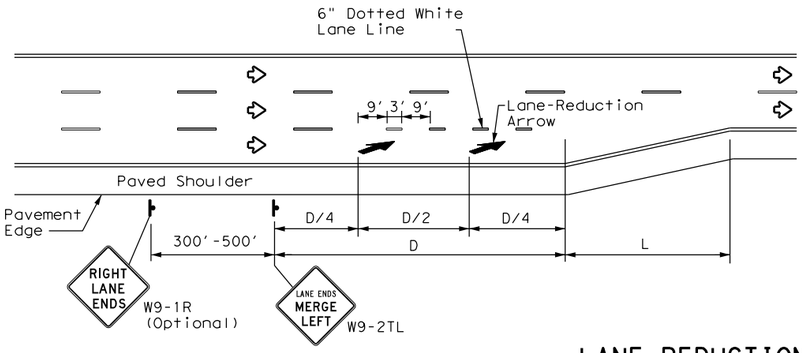
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		135

22B

DATE: 3/29/2024 $TIME$
FILE: $FILE$

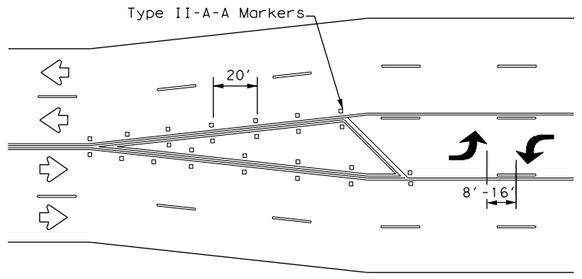


LANE REDUCTION

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

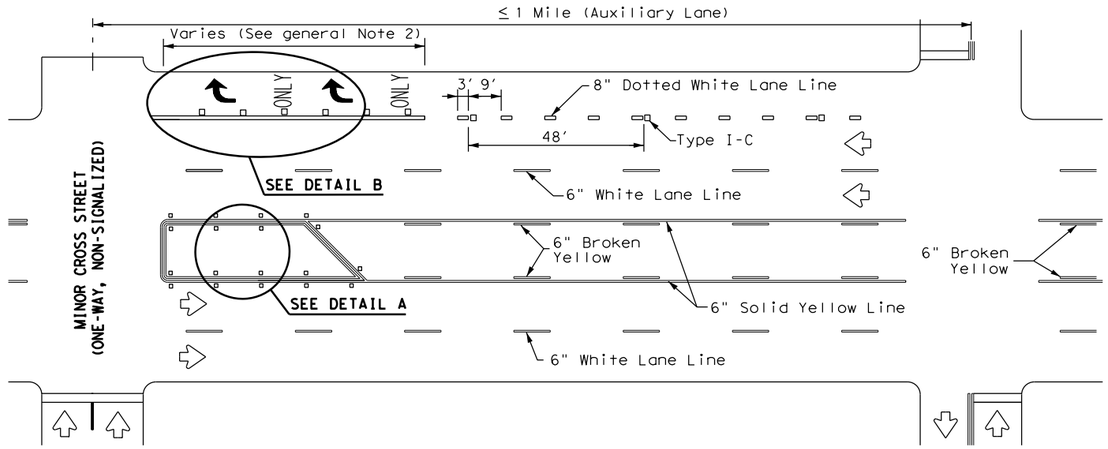
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

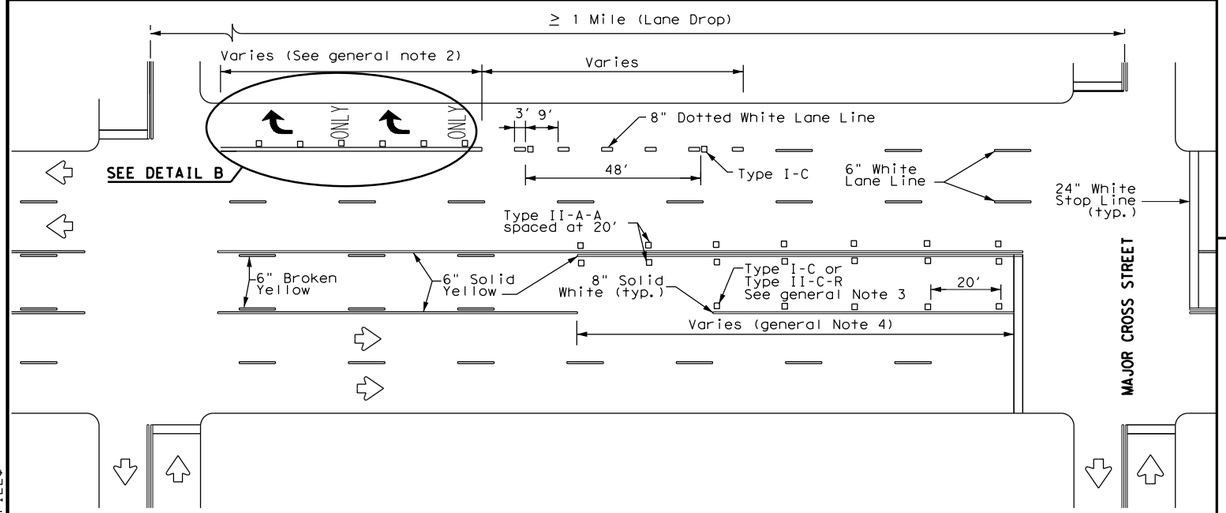
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

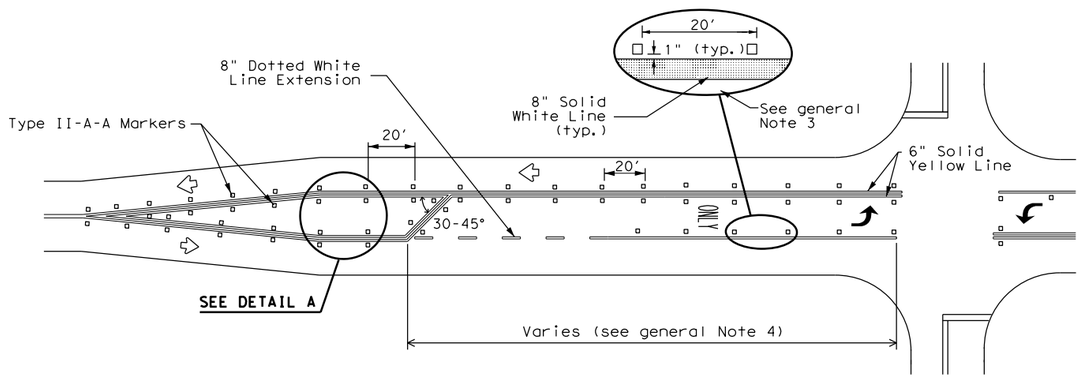
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



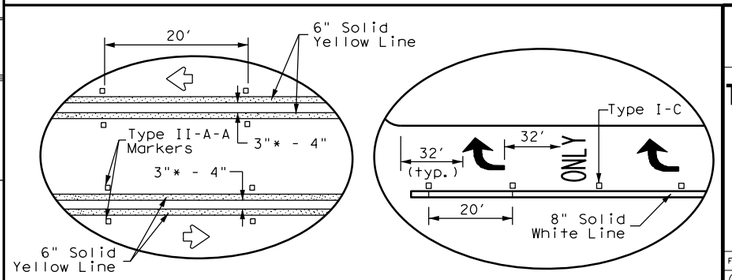
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		136

22C

DATE: 3/29/2024 $TIME$
FILE: $FILE$

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

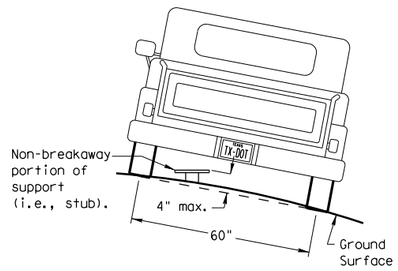
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

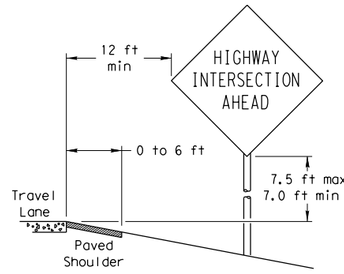
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

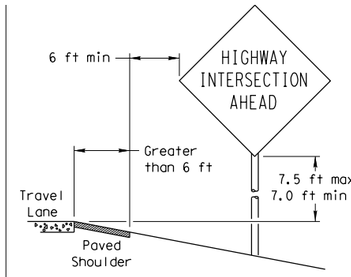
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

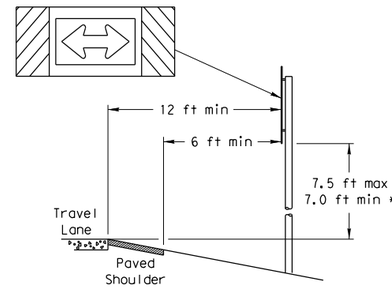
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



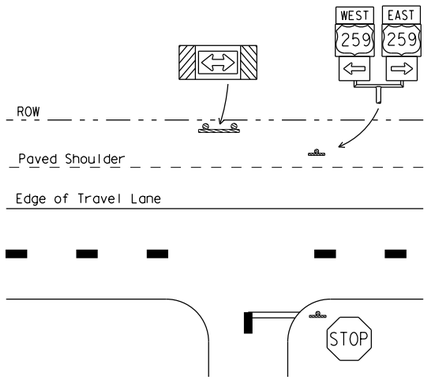
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

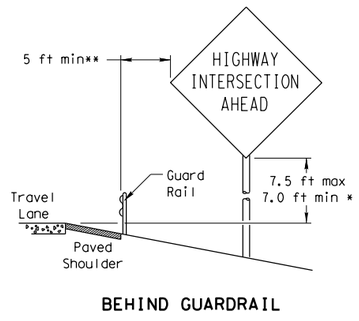
T-INTERSECTION



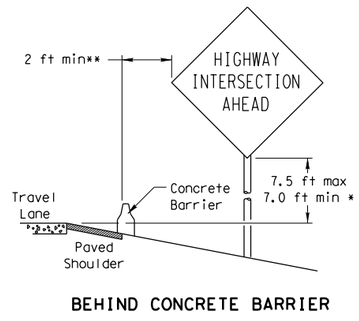
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

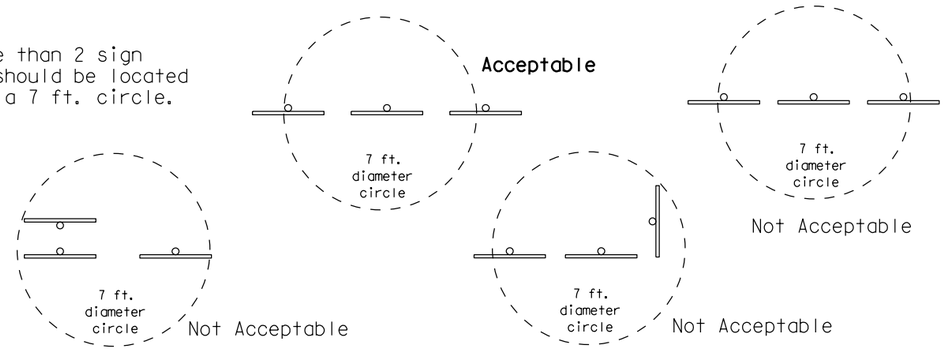
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

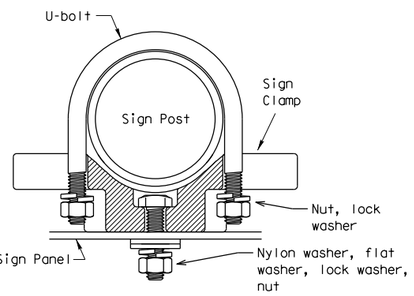
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

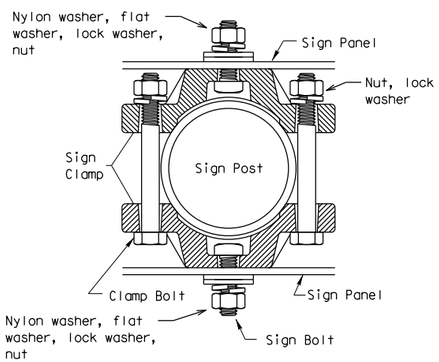


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

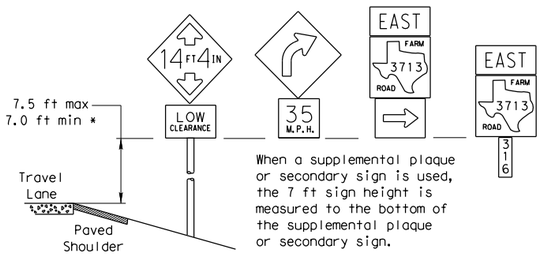
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



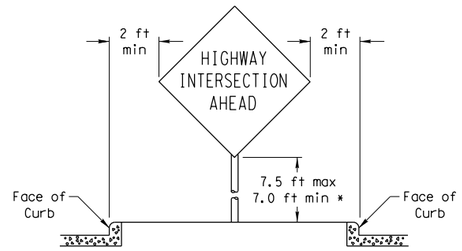
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



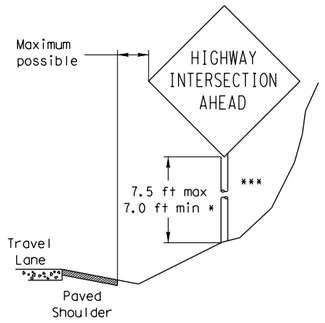
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

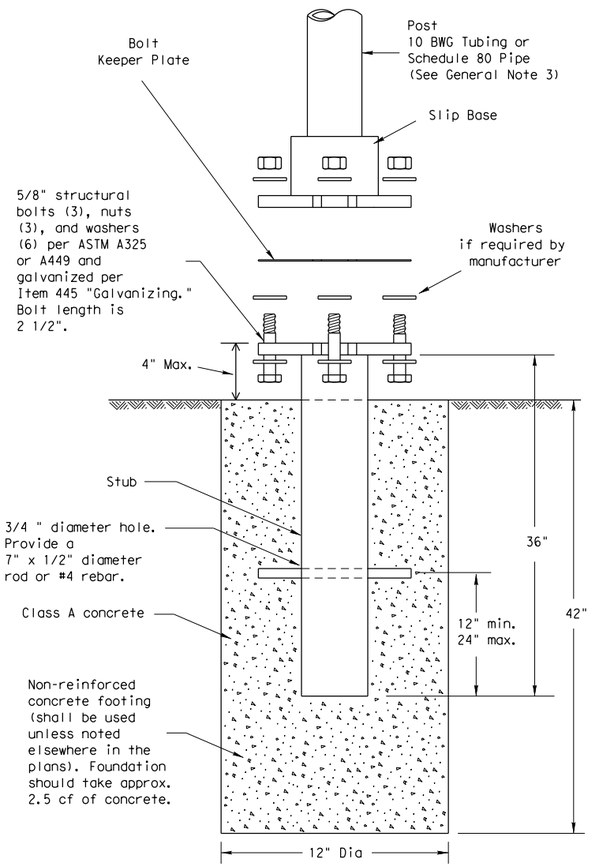
SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		137

26A

DATE=3/29/2024 $TIME$
FILE: $FILE$

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

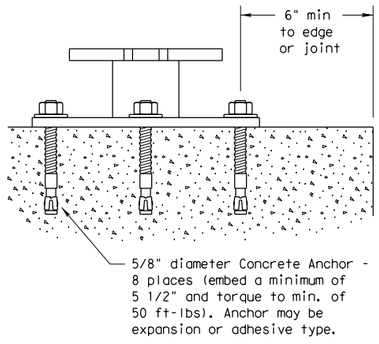
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

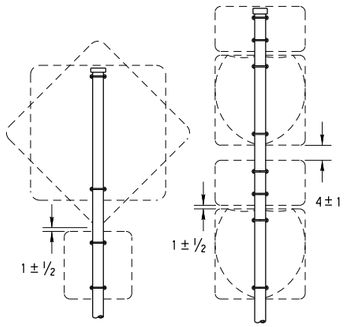
SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS			
9-08			

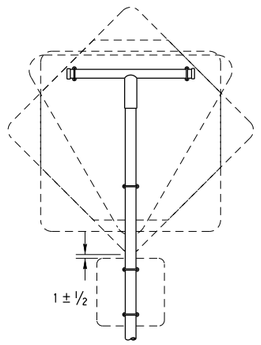
CONT	SECT	JOB	HIGHWAY
0027	01	042	US 90

DIST	COUNTY	SHEET NO.
YKM	COLORADO	138

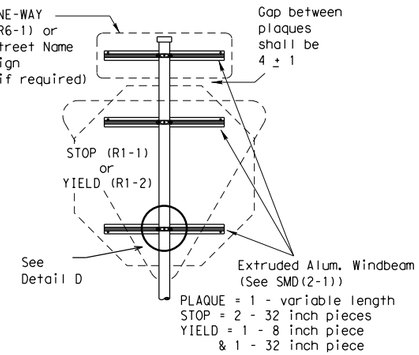
DATE:8/29/2024 $TIME$
FILE:$FILE$



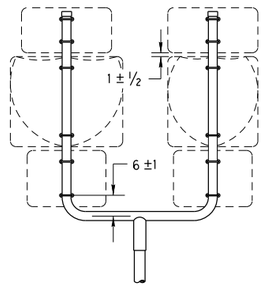
SM RD SGN ASSM TY XXXXX(1)XX(P)



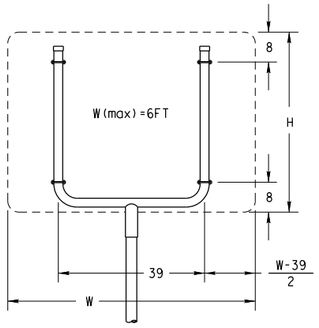
SM RD SGN ASSM TY XXXXX(1)XX(T)



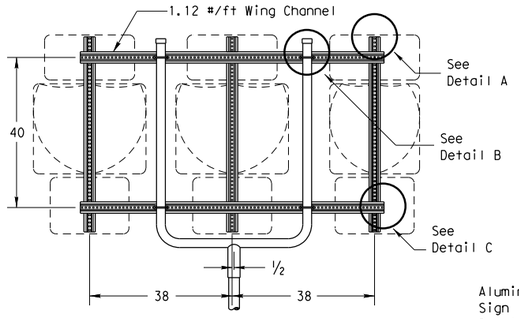
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



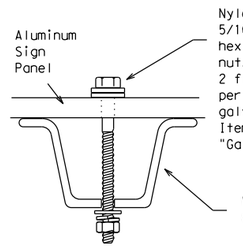
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

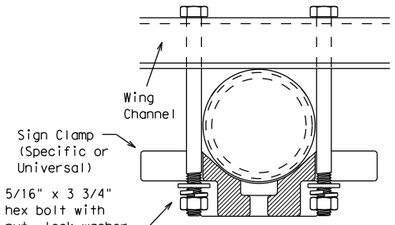


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



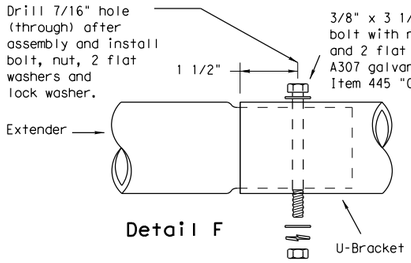
Top View

Detail A



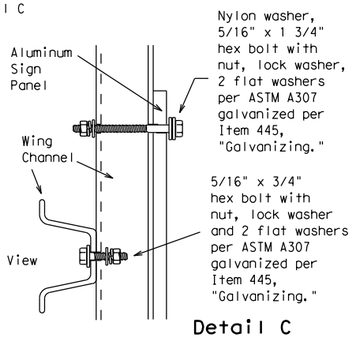
Top View

Detail B

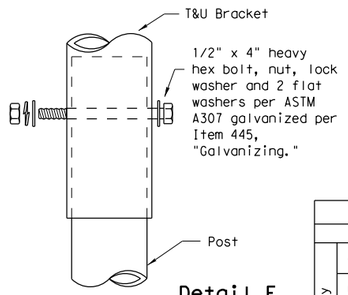


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



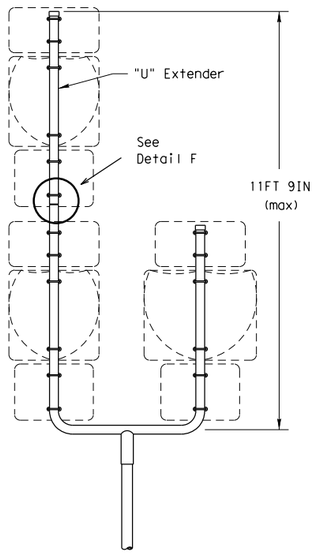
Detail E

GENERAL NOTES:

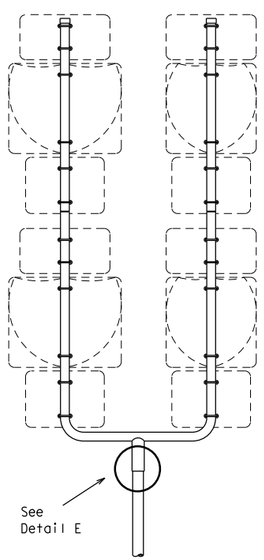
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

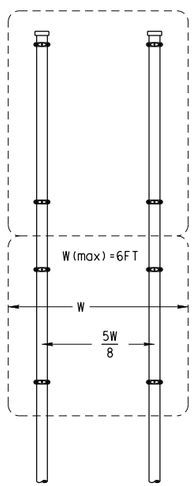
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



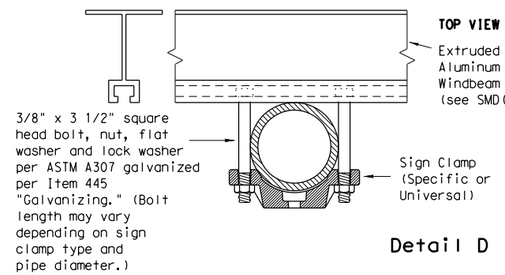
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



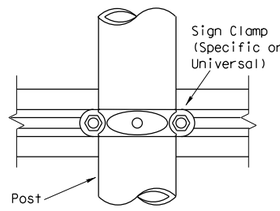
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



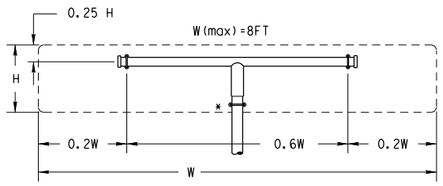
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



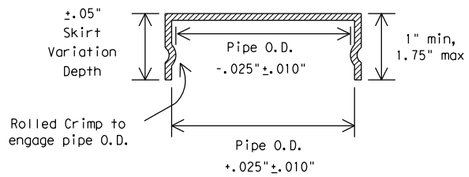
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

DATE: 3/29/2024 $TIME$
FILE: $FILE$

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

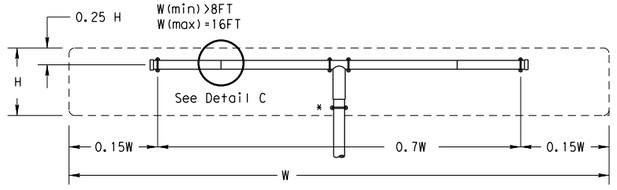
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0027	01	042	US 90

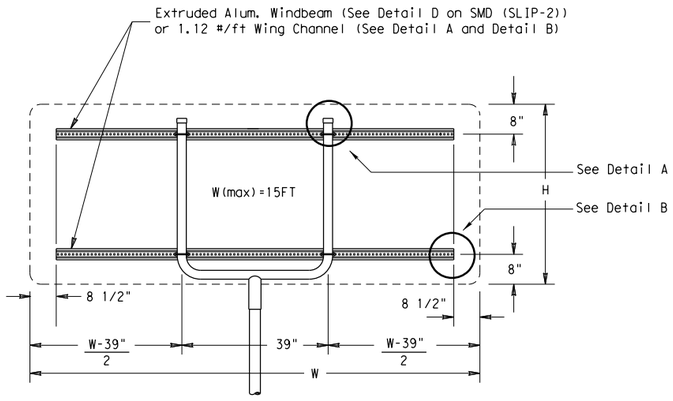
DIST	COUNTY	SHEET NO.
YKM	COLORADO	139

26C

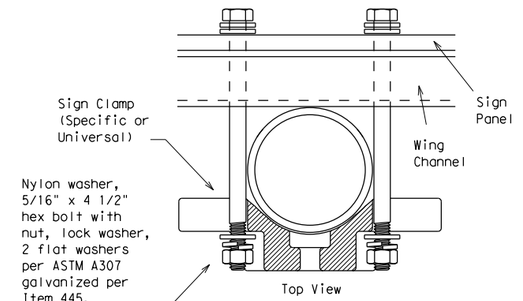


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

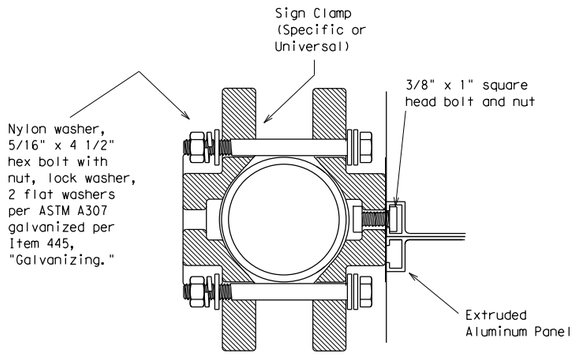
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

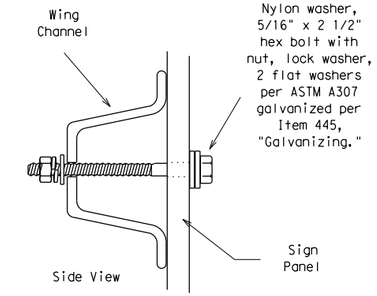


Detail A

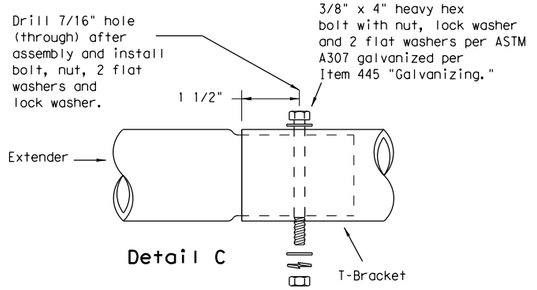


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

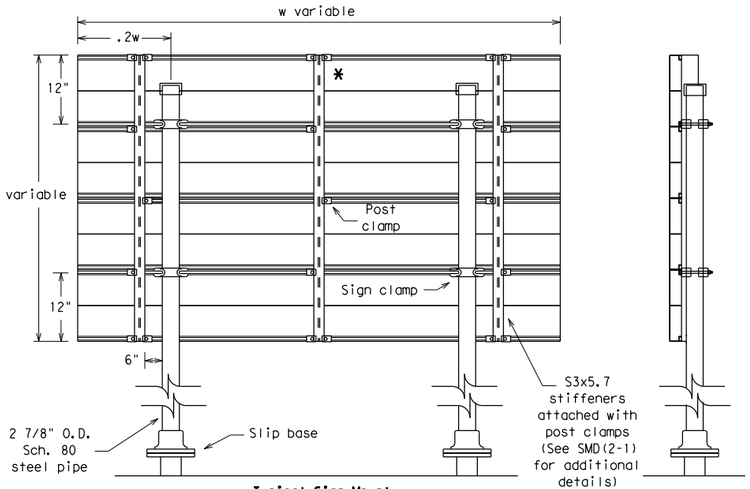


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

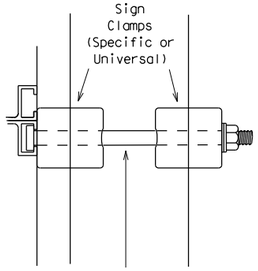


Typical Sign Mount

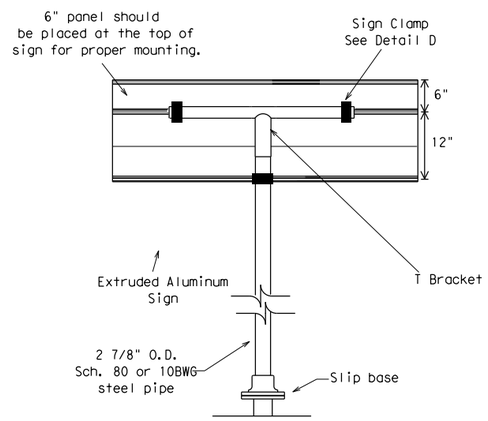
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

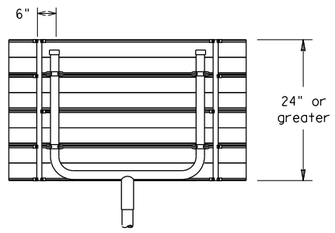
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS

9-08

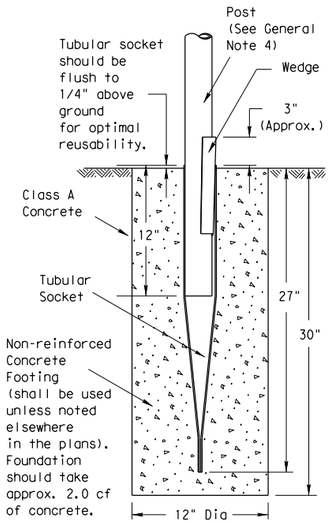
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0027	01	042	US 90

DIST	COUNTY	SHEET NO.
YKM	COLORADO	140

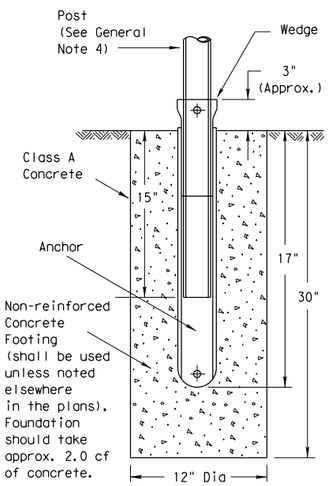
DATE: 8/29/2024 $TIME$
FILE: $FILE$

Wedge Anchor Steel System



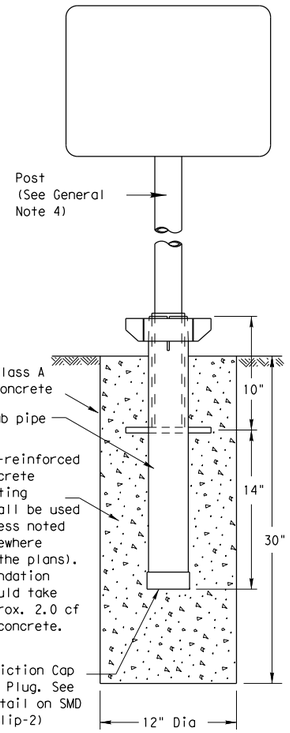
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

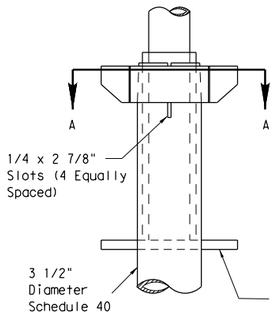


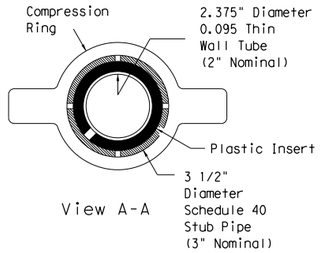
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



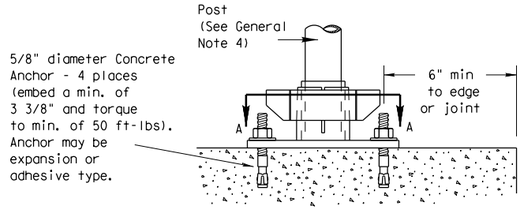
SM RD SGN ASSM TY TWT(X)UA(P)



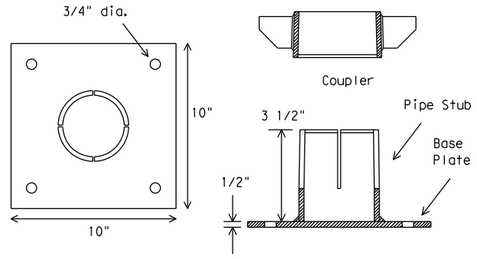


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

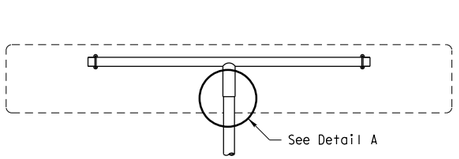


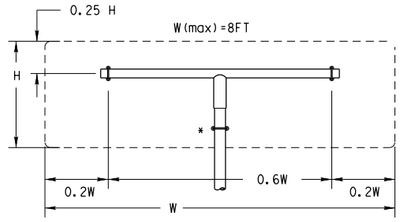
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

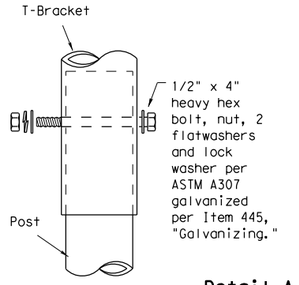
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0027	01	042	US 90
DIST	COUNTY		SHEET NO.
YKM	COLORADO		141

26E

DATE$ 3/29/2024
FILE: $FILE$
$TIME$

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0027-01-042

1.2 PROJECT LIMITS:
From: AT THE COLORADO RIVER IN COLUMBUS

To: (STR# 0027-01-001)

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 29°42'23.47"N ,(Long) 96°32'25.80"W

END: (Lat) 29°42'19.95"N ,(Long) 96°31'55.31"W

1.4 TOTAL PROJECT AREA (Acres): 0.4

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.2

1.6 NATURE OF CONSTRUCTION ACTIVITY:
For the construction of rehabiliation of existing bridge conisting of rehabilitate bridge.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
NORWOOD LOAM & MOHAT LOAM	0% TO 1% SLOPE AND RARELY FLOODS

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

X PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

X Mobilization
X Install sediment and erosion controls
☐ Blade existing topsoil into windrows, prep ROW, clear and grub
X Remove existing pavement
X Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
X Remove existing metal beam guard fence (MBGF), bridge rail
X Install proposed pavement per plans
☐ Install culverts, culvert extensions, SETs
X Install mow strip, MBGF, bridge rail
☐ Place flex base
X Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
X Revegetation of unpaved areas
X Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

X Sediment laden stormwater from stormwater conveyance over disturbed area
X Fuels, oils, and lubricants from construction vehicles, equipment, and storage
X Solvents, paints, adhesives, etc. from various construction activities
X Transported soils from offsite vehicle tracking
X Construction debris and waste from various construction activities
X Contaminated water from excavation or dewatering pump-out water
X Sanitary waste from onsite restroom facilities
X Trash from various construction activities/receptacles
X Long-term stockpiles of material and waste
X Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
	COLORADO RIVER BELOW LA GRANGE (1402)

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

X Development of plans and specifications
X Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
☐ Other: _____
☐ Other: _____
☐ Other: _____

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			142
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	COLORADO	
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- X Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- X Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- X Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			143
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	COLORADO	
CONT.	SECT.	JOB	HIGHWAY NO.
0027	01	042	US 90

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. If applicable list MS4 operator that may receive discharges from this project. MS4 operator should be notified prior to construction activities.

- [x] Prevent stormwater pollution erosion and sedimentation in accordance with TPDES Permit TXR 150000.
- [x] Comply with the SW3P and revise when necessary to control pollution or as required by the Engineer.
- [ ] Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA, or other inspectors.
- [ ] When Contractor project specific locations (PSL) increase disturbed soil area to 5 acres or more, sumbit Notice of Intent (NOI) to TCEQ and Engineer.
- [ ] MS4 Operator(s):

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

- [ ] No USACE Permit Required
- [x] Work is authorized by the USACE under a Nationwide Permit **3** without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set.
- [ ] Work is authorized by the USACE under a Nationwide Permit _____ with a Pre-Construction Notification (PCN). The project specific permit issued by the USACE is included in the plan set.
- [ ] Work is authorized by the USACE under a Individual Permit (IP). The project specific permit issued by the USACE is included in the plan set.
- [ ] Work would be authorized by the USACE. The project specific permit issued by the USACE or Nationwide Permit will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

- [ ] No United States Coast Guard (USCG) Coordination Required
- [ ] United States Coast Guard (USCG) Permit
- [x] United States Coast Guard (USCG) Exemption

Best Management Practices

Erosion	Sedimentation	Post Construction TSS
[x] Temporary Vegetation	[x] Silt Fence	[x] Vegetative Filter Strips
[ ] Vegetation Lined Ditches	[ ] Rock Filter Dam	[ ] Vegetation Lined Ditches
[ ] Sodding	[ ] Sand Bag Berm	[ ] Grassy Swales

No Additional Comments

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications 162, 164, 192, 193, 506, 730, 751, and 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

Additional Comments

-Minimize the amount of vegetation proposed for clearing. Removal of native vegetation, particularly mature native trees and scrubs, will be avoided to the greatest extent possible.
-The use of any non-native plant species in re-vegetation will be discouraged.
-Avoid vegetation clearing activities during the nesting season, March through August.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

Additional Comments

Freshwater Mussel BMPs:

• All work will occur from land or from the bridge deck. Work will not occur within the water, nor will equipment enter the water at any time during construction.
• The contractor will use debris netting or fencing while conducting over-water work to prevent debris resulting from construction activities from entering waterways.
• Containment of airborne particles during LBP abatement, welding, burning, and torch cutting will be achieved by a containment system, air quality and emission testing, abrasive blast recycling system. Proper waste storage and disposal methods per specifications provided in TxDOT (2014) and relevant federal and state laws.
• In situations where overland water flow from adjacent ROW would move onto the structure, the Contractor will place flow diverters to redirect the water away from the structure.

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structutres not including box culverts)? Yes [x] No [ ]

Are results of the asbestos inspection positive (is asbestos present)? Yes [ ] No [x]

TxDOT is still required to notify DSHS 14 working days prior to any scheduled demolition.

The Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Additional Comments

Lead Paint in green paint on metal I-beams and support structures, barrier rails, and truss system. Paint coatings on other metal bridge components that are similar to the identified lead-based paints should be assumed to contain lead unless testing proves otherwise.

VII. GENERAL NOTES

Notify the United State Coast Guard (USCG) for any temporary closures or alterations to navigability 60 days in advance of channel closure.

Notify the TxDOT Engineer immediately if any vessel makes contact with a TxDOT bridge.

The contractor's attention is directed to the fact that discharges of permanent or temporary fill material into the waters of the United States, including jurisdictional wetlands, as necessary for construction, will require specific approval of the USACE under Section 404 of the Clean Water Act.

TxDOT will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and it's potential to affect USACE jurisdictional areas. The contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the contractor responsible for following all conditions of the approved permit. If the contractor cannot work within the limits of the permit(s), then it becomes the contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the exiting permit(s) as origianlly obtained by the department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the United States, including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The contractor shall maintain near normal flow of any jurisdictional waters of the United States at all times during construction. If the contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Yoakum District Environmental Coordinator.

DATE:
FILE:

Version 13.1

Texas Department of Transportation

TxDOT Yoakum District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		144

VIII. OTHER ENVIRONMENTAL ISSUES	VIII. OTHER ENVIRONMENTAL ISSUES	VIII. OTHER ENVIRONMENTAL ISSUES

Freshwater Mussel BMPs continued:

• TxDOT specification Item 446 for the cleaning and painting of steel requires the contractor to submit a plan that details the procedures and type and size of equipment proposed to keep public and private property and the environment from being adversely affected by the cleaning and painting operations. Approval of the plan is required before cleaning and painting operations begin (TxDOT 2014). Environmental controls such as dehumidification, heaters, or additional containment measures will be employed as needed to control and maintain favorable atmospheric conditions in all areas of the containment.
• When a rain event is predicted within 72 hours, the contractor will reinspect and/or reinforce all BMPs to ensure they are in proper working order to prevent the runoff of sedimentation. Any loose sediment will be surrounded by proper sedimentation control measures or collected and removed from the floodplain prior to rain.
• Prior to coming onsite, contractors must inspect and clean construction vehicles offsite to remove any foreign soils or hazardous materials before they enter the action area. Discharge of water from cleaning and washing of construction vehicles to the ground or surface water is prohibited. On location, designated wash areas and washing methods must be approved by the project engineer prior to placement and the location will be recorded by the engineer. Wash water (wastewater) must be collected and properly disposed of at a facility permitted to receive wash water.
• Contractors must provide secondary containment for larger quantities (i.e., over 500 cumulative gallons) of liquid materials held in storage tanks; liquid material storage must be located in TxDOT approved areas, away from the water, that are not easily inundated by flooding. Any hydrocarbons or hazardous substances must be stored securely and out of the weather, away from the water to avoid accidental spills. In the event of a spill which may be hazardous, the spill coordinator must be contacted immediately.
• Contractors must contain all chemical substances including fuels, de-icing agents, paints, sealants, lubricants, and epoxies. Contractors must use storage containment structures, collection mats, drop cloths, filter mats, and containment curtains to prevent chemical substances from entering the environment. All chemical substances must be stored outside of the floodplain.
• Contractors must properly collect, store, and dispose of all wastes generated during activities in approved landfills.
• Contractors must monitor all erosion and sediment BMPs daily and after significant rain events and repair to restore function of BMPs immediately.
• Although no vegetation will be removed as a part of this project, any areas where ground disturbance (unplanned or inadvertent) occurs because of the project will be seeded with native rural clay soil seed mix developed for the TxDOT Yoakum District.
• All temporary erosion and sediment BMPs must be removed at the completion of the project once final stabilization is reached in accordance with the TCEQ CGP and project specific SWP3s.

DATE:
FILE:

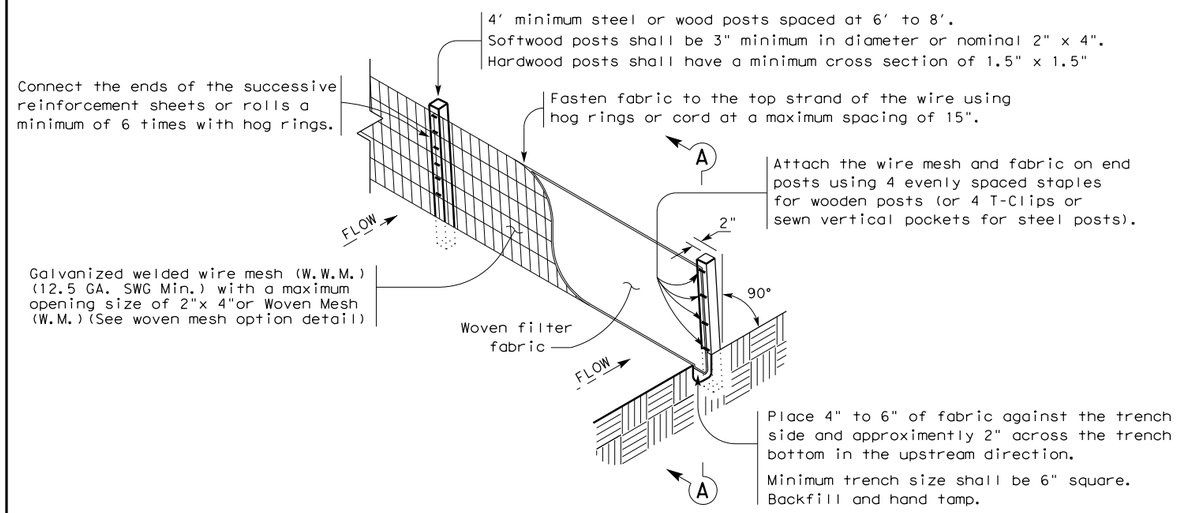
Texas Department of Transportation

TxDOT Yoakum District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

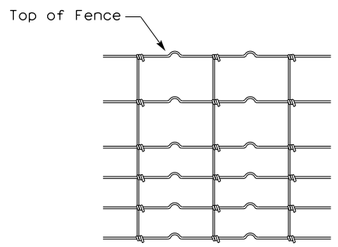
EPIC

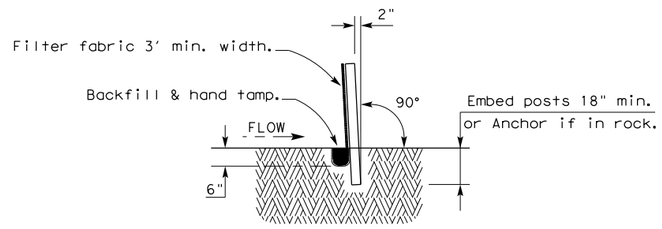
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		145



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

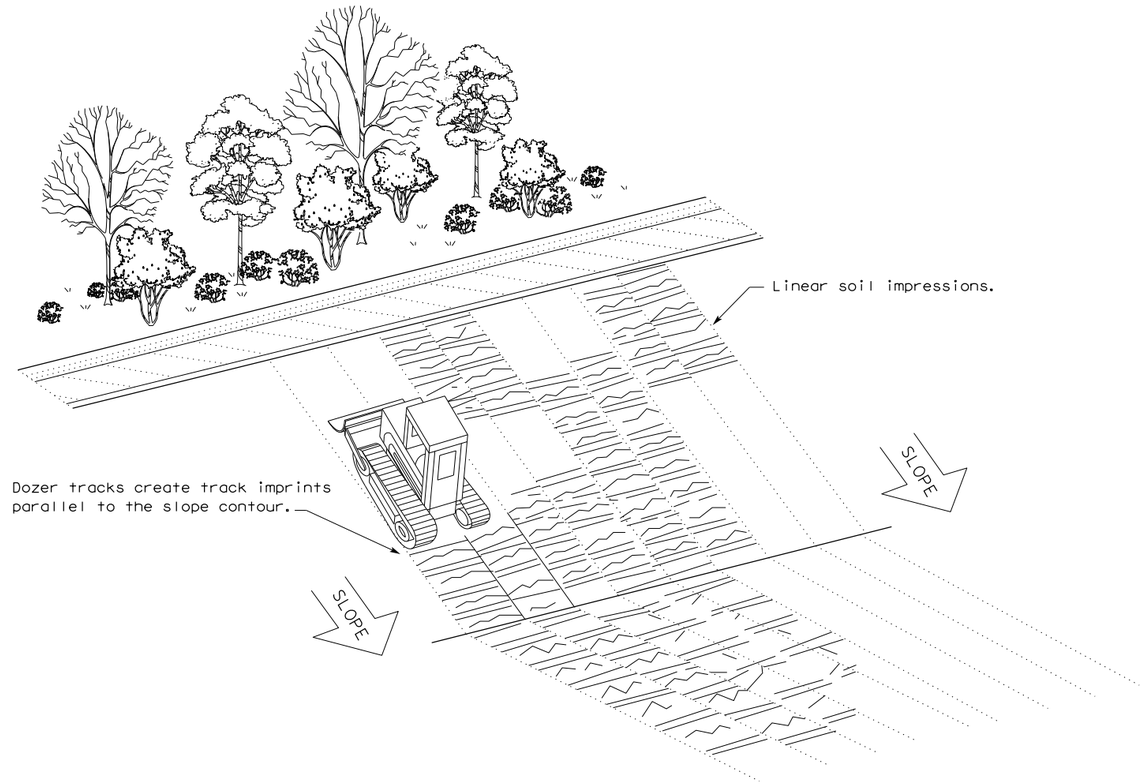
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM	DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0027	01	042		US 90	
	DIST	COUNTY			SHEET NO.	
	YKM	COLORADO			146	

3/8/2024
$FILE$

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☑ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 743281N
Crossing Type: AT GRADE
RR Company Operating Track at Crossing: UNION PACIFIC RAILROAD
RR Company Owning Track at Crossing: UNION PACIFIC RAILROAD
RR MP: 84.220
RR Subdivision: GLIDDEN
City: COLUMBUS
County: COLORADO
CSJ at this Crossing: 0027-01-042
Latitude: 29.7075016
Longitude: -96.5380134

Scope of Work, including any TCP, to be performed by State Contractor:

THE EXISTING BRIDGE AND ROADWAY ON US 90 (WB) WILL BE RESTRIPED PARALLEL TO THE RAILROAD RIGHT OF WAY. ALL WORK, EQUIPMENT AND TCP WILL BE OUTSIDE OF RAILROAD RIGHT OF WAY, BUT IS WITHIN 50'.

Scope of Work to be performed by Railroad Company:

NONE

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

☐ Expected
☐ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☐ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☐ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☑ Not Required	
☐ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☑ Not Required
☐ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: UNION PACIFIC RAILROAD
Railroad Emergency Line at: 888-877-7267
Location: DOT PARALLEL/NEAR DOT 743281N
RR Milepost: FROM 84.370 TO 83.750
Subdivision: GLIDDEN

RRD Review Only
Initials: _____
Date: 12/07/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0027	01	042		US 90	
6/2023		DIST	COUNTY			SHEET NO.	
		YKM	COLORADO			147	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		148

DATE: 3/29/2024 $TIME$
FILE: $FILE$

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0027	01	042	US 90
	DIST	COUNTY		SHEET NO.
	YKM	COLORADO		149

DATE: 3/29/2024 $TIME$
FILE: $FILE$